



PHD

Exploring how guidelines and other factors influence prescribing in cardiology and the role of clinical pharmacists in Sudan

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UNIVERSITY OF BATH

Exploring how guidelines and other factors influence prescribing in
cardiology and the role of clinical pharmacists in Sudan

Hwaida Misbah Elsadig

A thesis submitted for the degree of
Doctorate of Philosophy
Department of Pharmacy and Pharmacology
University of Bath

[October 2015]

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Abstract

Introduction: The use of guidelines in prescribing has become part of clinical practice in many countries around the world. Guidelines are considered to provide information based on scientific evidence from high quality research and hence are expected to lead to appropriate prescribing. Prescribing based on evidence is expected to improve morbidities and mortalities. Pharmacists in different parts of the world are acquiring a clinical professional identity especially in hospital settings where they have moved to bed-side roles to become an effective member of the patient–care team. They are thus expected to play an important role in assisting appropriate prescribing and have a positive impact on patient care. The influence of guidelines on prescribing and the practice of clinical pharmacy have not been studied in Sudan.

Aim: The aim of the study was to investigate the use of guidelines (if any) for prescribing by doctors in the main cardiac hospitals in Sudan, and to explore the influence of availability (or non-availability) of guidelines on the new role of clinical pharmacy in hospitals in Sudan.

Method: The study used a mixed method approach to examine the study questions. Interviews were conducted with the cardiology consultants in two of the main cardiac hospitals in Sudan. This was followed by a survey among all the doctors in the hospitals. Later on a focus group discussion was carried out with clinical pharmacists in the two hospitals followed by an online survey sent to the available email addresses of clinical pharmacists in Sudan.

Results: Twelve prescribers were interviewed and 47 prescribers (60%) replied to the questionnaire that followed. The majority of the doctors relied on foreign guidelines to prescribe for their patients. The doctors acknowledged the limitation of using foreign guidelines in Sudan. Few prescribers were not in favour of following any guidelines as they perceived that the practice in Sudan does not allow implementation of guidelines. The prescribers were positive about the new role of clinical pharmacists in patient care but they seem not to be in contact with these clinical pharmacists. On the other hand, four pharmacists participated in one focus group and 51(34%) completed the on-line survey. Clinical pharmacists faced a number of obstacles that hindered their progress in practice and the unavailability of guidelines was considered to be one of these obstacles. Other obstacles were related to the pharmacists themselves, to the lack of senior clinical pharmacists for leadership, to the environment they were working in and to the training they received in clinical pharmacy.

Conclusion: The making of guidelines is usually a tedious and costly process. Medical practice in places with limited resources has to rely on guidelines made in foreign countries if they want to get the benefits of these guidelines to their patients. The prescribers in Sudan had to find a way to adapt foreign guidelines to their patients and to the healthcare system they are working within. With regard to the clinical pharmacists in Sudan, they are faced with a number of obstacles that they will have to overcome in order to advance in their new role. The new clinical pharmacists will have to be the leaders to pave the way for clinical pharmacy in Sudan. However, they will require support from pharmacy educational institutions, other healthcare professionals and healthcare institutions.

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List of abbreviations

EBM	Evidence based medicine
RCT	Randomised controlled trials
WHO	World Health Organization
CDC	Centre for Disease Control and Prevention
IOM	Institute of Medicine
CVD	Cardiovascular disease
FIP	International Federation of Pharmacists
HIS	Health Insurance Scheme
FMOH	Federal Ministry of Health
CCU	Coronary care unit
A&E	Accident and Emergency
ACC	American College of Cardiology
ACCP	American College of Clinical Pharmacy
NICE	National Institute of Clinical Excellence
ESC	European Society of Cardiology
FGD	Focus group discussion
CPD	Continuous Professional Development
MI	Medicine Information
SSCP	Sudanese Society of Clinical Pharmacists
UK	United Kingdom
AH	Alshaab hospital
AGH	Ahmed-Gasim hospital
BHF	British Heart Foundation

CHAPTER 1 INTRODUCTION

The use of clinical guidelines has been adopted in many healthcare settings in different parts around the world (Shaneyfelt and Centor, 2009, Hewitt-Taylor, 2006). Prescribing guidelines are considered to assist in translating the evidence available from clinical trials into clinical practice and thus can lead to appropriate prescribing (Feder et al., 1999, Hewitt-Taylor, 2006, Woolf et al., 1999). Treatment options presented in clinical guidelines are derived from scientific evidence and hence it is said to improve morbidities and mortalities. However, in addition to the expected benefits from guidelines, there are also challenges to the use of guidelines, that if not addressed, can lead to guidelines being rejected (Berg, 1997, Keeley, 2003, Shaneyfelt and Centor, 2009, Woolf et al., 1999). One of the main challenges to the use of guidelines is that they should be made to suit the patients and the healthcare system in which they are supposed to be applied (Keeley, 2003, Lindback et al., 2014, WHO, 2007b). This can be a problem in developing countries like Sudan where this study was conducted, which may have limited resources to construct their own guidelines but at the same time may find international guidelines difficult to apply in their healthcare settings.

Another valuable source of information that can increase appropriateness in prescribing is the pharmacist (Calvert, 1999). Specifically in hospitals, and with the introduction of the clinical pharmacy service in hospitals in many countries around the world, these pharmacists are expected to have a role in assisting prescribing. A number of studies examined the positive contribution of clinical pharmacists in patient care in hospitals (Alison Dale, 2003, Anderson et al., 2010, Bond et al., 2001, Boyko et al., 1997, Horning et al., 2007, Howard et al., 2003, Leape et al., 1999, Miller et al., 2011). Pharmacists were also found to have a positive effect in ensuring that therapy is prescribed as per guidelines (Horning et al., 2007). Although the clinical role of pharmacists is well established in some countries, it is considered to be a new area of practice in some parts around the world including Sudan.

Considering the above, that is the use of clinical guidelines in prescribing and the potential role of clinical pharmacists in assisting prescribing, this research has thus examined the use of clinical guidelines in prescribing in Sudan and the new practice of clinical pharmacy in hospitals in Sudan with special regard to the influence of availability of clinical guidelines on the practice. Prescribing in cardiology was purposively selected for this study due to the increase in prevalence of cardiovascular disease in Sudan (Federal Ministry of Health, 2007), and also because it was argued to be one of the clinical disciplines with the most guidelines (Meulen, 2005).

1.1 Aim of the research

The aim of this study was to identify if guidelines are used and can be followed in prescribing in cardiology in Sudan, and to identify the influence of availability or non-availability of guidelines on the role of clinical hospital pharmacists in Sudan together with other challenges facing these pharmacists.

1.2 Structure of the thesis

The study was conducted in a sequential manner to encompass all areas of inquiry required. Different methods at different stages were used to collect the data for this study. Data collected at different stages helped to inform the next phase of the study. These different stages are presented in separate chapters in this thesis. Following this introduction chapter, the thesis outline can be described as follows:

Chapter 2 presents the literature review that underpins this study;

Chapter 3 outlines the aim, objectives and the main research questions of this study

Chapter 4 presents a framework of the methodology followed to meet the research objectives;

Chapter 5 discusses the first phase of data collection which was the interviews conducted with senior prescribers in cardiology in two of the main cardiology hospitals in Sudan. The interviews studied influences on prescribing, particularly the use of guidelines, and the prescribers' experience with the new role of clinical pharmacists in their hospitals;

Chapter 6 presents the survey conducted among cardiology prescribers in the two hospitals to examine their views with regard to the use of guidelines and their perceptions of the new clinical role of the pharmacists;

Chapter 7 describes the focus group discussion (FGD) that was conducted with the clinical pharmacists working in the cardiology hospitals. The FGD examined the views of the clinical pharmacists with regard to their new role, their contribution to patient care and the challenges they were facing in their practice;

Chapter 8 presents the online survey that was conducted among the clinical pharmacists of Sudan to explore their perceptions with regard to the role of clinical pharmacists, the obstacles facing clinical pharmacy and their views about the use of guidelines in clinical practice in Sudan;

Chapter 9 provides a final discussion of the key findings of this study, the areas of strength of the study, a reflection from the researcher and a suggested way forward from the study.

1.3 The Researcher

The idea of this research came from a previous work experience as a hospital pharmacist in the United Kingdom covering cardiology wards. Although there are different sources of information available nowadays, the use of clinical guidelines is considered to be a valuable source of information that assists healthcare professionals in the management of different medical conditions, and has become a familiar practice in hospitals in UK. Guidelines whether local, regional or national, promoted

by government or specialised bodies very much influenced doctors' prescribing and pharmacists' interventions in hospitals. As a pharmacist from Khartoum in Sudan, this led me to question whether guidelines are followed in prescribing for patients in cardiac hospitals in Khartoum and what influence do guidelines availability has on the contribution of the newly appointed clinical pharmacists in hospitals in Sudan.

Chapter 2 Literature review

2.1 Introduction

The aim of this chapter is to provide an overview of the key issues underpinning the development of this research project which was undertaken in Sudan. The first section will discuss some of the factors influencing prescribing in clinical practice, focusing on the use of clinical guidelines in prescribing as for the purpose of this study. The next part of the chapter will consider cardiovascular disease as an example of a clinical discipline with a large number of guidelines, with special reference to Sudan. The final part of this chapter will be about clinical pharmacy practice, the use of clinical guidelines by clinical pharmacists, also with special regard to the new role of clinical pharmacy in Sudan. The chapter is by no means intended to be an exhaustive discussion of all the literature behind clinical guidelines and clinical pharmacy but it is meant to provide a background for the issues investigated in this research based in Sudan.

2.2 Literature search criteria

A literature search was conducted at the beginning of the research and repeated at various stages during the project. As different aspects were examined in this project, the literature search was carried out using different search terms to cover the issues to be investigated. In addition, as new areas of interest emerged during data collection and were further investigated, new search terms were introduced during different stages of the literature search as described in Table 2.

The search involved a number of databases mainly Pubmed, Embase and Web of Knowledge. In addition journals such as Pharmacy World & Science and International Journal of Pharmacy Practice were searched. Most of the relevant studies obtained were found using Pubmed. Hence, towards the end of the study, the 'repeat' literature search was conducted using mainly Pubmed. The studies from the literature were selected based on their relevance to the issues to be examined in this study. This was

identified from the title of the study or the abstract. No restriction was put on the year of publication, but only studies available in English language were selected.

Table 2 Literature search

HISTORY OF LITERATURE SEARCH	SEARCH TERMS	NUMBER OF RELEVANT ARTICLES IDENTIFIED
October 2010 Web of science, Web of Knowledge, University library theses, IJPP, UK Pubmed-central, Google scholar, PJ, BMJ. Hospital Pharmacist, Clinical Pharmacy, the Annals of Pharmacotherapy, NeLM, pharmacy practice.org	Evidence based medicine Prescribing and cardiovascular disease Cardiovascular disease and Guidelines Clinical pharmacy /pharmacist Clinical pharmacy and cardiovascular disease Pharmacists and prescribing Hospital pharmacists and interventions Clinical pharmacy in Sudan Factors influencing clinical decisions	70 relevant articles
February 2011 Pubmed, Embase, Web of knowledge, NeLM	Prescribing and Guidelines Prescribing and cardiology Prescribing decisions Factors affecting prescribing Sudan and cardiovascular diseases Khartoum and cardiovascular disease Sudan and guidelines	13 new relevant articles
February/March 2012 Pubmed, Embase	Sudan and cardiovascular diseases Sudan and Practice Guidelines Hospital and cardiology Cardiology and prescribing guidelines Hospital pharmacy and Sudan Hospital pharmacy and cardiology Pharmacy practice and Sudan	2 new relevant articles
September 2012 Pubmed, Embase, Web of knowledge	Prescribing and Guidelines in Sudan Prescribing decisions Factors affecting prescribing Prescribing and cardiology Sudan and cardiovascular disease Pharmacy Practice/Clinical pharmacy in Sudan	No new relevant articles
April 2013 Pubmed	Obstacles in clinical pharmacy practice Barriers to clinical pharmacy practice Pharmacists and guidelines Pharmacists implementing guidelines Pharmacists adherence to guidelines	7 new relevant articles
July 2013 Pubmed	Pharmacists adherence to guidelines Obstacles and hospital pharmacy Factors affecting prescribing	5 new relevant articles
August 2014 Pubmed,	Guidelines and Pharmacists, Pharmacy role and guidelines, Pharmacy benefit and guidelines Guidelines and limited resources Pharmacy and professionalism Professionalism and guidelines	6 new relevant articles
Pubmed February 2015	Guidelines and Professionalism Clinical pharmacy development Appropriate prescribing/Evidence based medicine Guidelines and clinical experience	4 new relevant articles

2.3 Prescribing of medicinal therapy

Prescribing has been practised for a long time in history and the symbol 'Rx' generally used to denote a prescription, is said to have been around for centuries. Prescribing of medicinal therapy is the most commonly used form of treatment intervention (Lundborg, 1999). The use of medicinal therapy has grown dramatically as the range of medication used for different diseases has widened. To make sure that patients are getting the maximum benefit from their medicinal therapy, prescribers as well as other healthcare professionals need to ensure that prescribing is conducted appropriately and safely. Healthcare institutions and regulatory bodies also play a role in ensuring the appropriateness and safety of prescribing. The World Health Organization (WHO) provided a guide on good prescribing with the aim to ensure that the most appropriate choice of drug for an individual patient, in the right form and for the right duration of time is to be made (World Health Organization, 1994). The aim from the guide was for future prescribers not just to be able to select the right drug but also to use existing clinical guidelines to achieve rational and appropriate prescribing. Examining the use of clinical guidelines in prescribing is one of the aims of this study.

2.4 Appropriate prescribing

The cognitive approach to prescribing is considered to be based on two criteria:- 'problem solving', which is the early reasoning process involved in diagnosis and 'decision making' which is the final opinion and judgement part of the clinical decision (Elstein and Schwartz, 2002). Prescribing, and in particular appropriate prescribing, is advocated as a mixture of science and art (Buetow et al., 1997). Whereas evidence and safety of a certain treatment are the main factors in prescribing, other factors like intuition, limited resources and patient related factors have to be considered. Thus achieving appropriate prescribing combine both scientific evidence and professional judgement.

One of the definitions given for appropriate prescribing is when 'the benefits anticipated from the treatment prescribed far outweighs any risks' (Brook, 1994). Another definition of appropriate prescribing is 'the outcome of a process of decision making that maximizes net individual health gains within society available resources' (Buetow et al., 1997). This later definition which relates the individual health gain with the society resources in prescribing is an important element for this study which is examining some of the challenges of prescribing in Sudan considering the limited resources.

Furthermore, a distinction has been made between rational prescribing and appropriate prescribing (Aronson, 2004). Whereas rational prescribing is considered to end up with the decision to prescribe and the choice made, appropriate prescribing is considered as the whole process resulting in desirable outcomes (Aronson, 2004, Buetow et al., 1997). These outcomes can possibly make a rational prescribing decision inappropriate and in some occasions an appropriate prescribing decision irrational (Aronson, 2004, Yu et al., 1991). However, this does not minimize the importance of rational decision making as it is more likely that rational prescribing will lead to appropriate prescribing (Aronson, 2004). Several methods have been suggested to measure the appropriateness of prescribing focusing on factors related to the drug itself such as, efficacy, drug-drug interactions, duration of therapy and even cost effectiveness (Aronson, 2004, Hanlon et al., 1992). What is important for this study which is looking into the use of clinical guidelines in practice in Sudan, is that appropriate prescribing has been considered as an element in transferring scientific evidence into clinical practice (Brook et al., 1986, Buetow et al., 1997).

The variation in prescribers' views about the concept of appropriate prescribing was studied by Higgins and Tully (2005). The study involved interviewing 17 doctors from different specialities and with different years of experience ranging from junior doctors to senior consultants, all working

in a teaching hospital in UK. For junior doctors, appropriate prescribing meant the match between the right drug and the patient presentation. This match according to some doctors was made easier by the availability of protocols and guidelines that can be followed. For consultants, appropriate prescribing was perceived to be a more complex approach which could include factors related to the health care system as a whole such as considering cost-effective treatment.

The study found that the concept of prescribing changes gradually as prescribers become more experienced moving towards a more holistic approach for prescribing. However, the above finding does not make senior prescribers better in achieving appropriate prescribing than juniors as this was found not always to be true (Stolley et al., 1972). The study is very limited in that it took place in one hospital, and as variation in prescribing is known to occur between different practices, these concepts of appropriate prescribing can vary between doctors of the same grade in different hospitals. To confirm the above findings more studies are required whereby appropriate prescribing is examined for the same prescribers at different stages in their career.

2.5 Factors influencing prescribing

The presumption that different prescribers can make different decisions when presented with the same medical condition is attributed to the fact that there are medical and non-medical factors that influence prescribing (Denig et al., 1993, Hemminki, 1975, Segal and Hepler, 1982). The effect of these factors on prescribing can differ between different prescribers, health care organizations and between different countries. In addition, different physician characteristics such as age, training and experience are believed to have an effect on the quality of prescribing (Stolley et al., 1972). In an earlier review into the factors affecting prescribing, Hemminki

(1975) attributed some of the main influences on prescribing on the physician characteristics, the education of the physician, the patient characteristics, the pharmaceutical industry, the working circumstances in any healthcare system and the influence of other colleagues. Some of these factors were considered to be easier to change, such as the effect of the pharmaceutical industry, while others were more difficult to modify such as the characteristics of the doctor and the patient.

In more recent published studies from different parts of the world, other classifications were given for factors affecting prescribing (Joyce et al., 2011, Oshikoya et al., 2011, Theodorou et al., 2009, Ljungberg et al., 2007, Greenfield et al., 2005, Nutescu et al., 2005). Factors influencing prescribing were generally classified in these studies as either directly drug-related or indirectly drug related. That is, the non-drug factors such as doctors' characteristics were not considered in these studies. Most of the prescribers in these studies claimed that a number of factors affected their prescribing including, recommendation by clinical guidelines, the cost of treatment, the hospital drug formulary and the advertisement provided by the pharmaceutical industry. However, the level of importance of any particular factor on drug choice was different between prescribers in different settings and countries where the studies were conducted. For example, in a study in Nigeria by Oshikoya et al (2011), the majority of the prescribers involved in the study identified using the pharmaceutical company representative as a source of drug information for prescribing. This is different from prescribers in other countries in Europe and USA where the information provided by pharmaceutical companies was considered to be of less influence (Schumock et al., 2004, Theodorou et al., 2009).

Considering the focus of this study, most doctors as well as other healthcare professionals in a number of studies, explained that one of the factors directly affecting their drug choice was prescribing guidelines (Ljungberg et al., 2007, Blackburn et al., 2004, Nutescu et al., 2005). However, using recommendations from clinical guidelines may not be

strictly followed in all situations. For example, in the study by Nutescu et al. (2005) in the United States, participant doctors in community hospitals considered that when prescribing within the same therapeutic class, they depended on their experience and not guidelines for the choice of the suitable member within the same class.

Not only prescribers' views but also the views of clinical pharmacists were sought in some studies that described the influences on drug choice (Nutescu et al., 2005, Schumock et al., 2004). In a survey based study by Schumock et al (2004) in the United States about influences on drug choice, both physicians and clinical pharmacists who participated in the study considered direct related drug factors such as effectiveness of the drug, as having higher influence than non-direct factors, for example, the effect of the pharmaceutical industry. However, physicians and clinical pharmacists differed in their response with regard to the influence of experience in prescribing. While physicians considered personal experience to be an important influence, clinical pharmacists thought of it as being of less importance compared to direct drug related factors. Although the study has its limitations including the limitations of self-reports, the main element of interest in this study is that it considered pharmacists as members of the healthcare team with key roles in recommending medications and thus their views on prescribing are of importance. In recognition of this, the second part of this research is aimed to explore the role played by clinical pharmacists in assisting prescribing.

The different factors that can lead to variation in prescribing as discussed earlier may lead to patients with similar conditions not receiving similar pharmaceutical therapies required for their conditions. It has been proposed that the use of clinical guidelines could limit the unjustified variation in prescribing and ensure that patients are getting the drugs that according to evidence from research, can improve their medical conditions (Theodorou et al., 2009, Ljungberg et al., 2007). For the purpose of this

research; the effect of guidelines in particular as a tool in guiding the choice of pharmacological interventions and as a factor affecting prescribing is going to be examined in the following part of this review.

2.6 Clinical guidelines and their influence on prescribing

Healthcare professionals are facing several issues that may challenge appropriate prescribing (Feder et al., 1999). These include, rising healthcare costs and the increasing volume and complexity of information coming across from scientific research. Moreover, as large numbers of drugs are becoming available with more clinical conditions requiring the use of a number of drugs; the safety of use of these drugs has necessitated the availability of guidance on their use (Andrejak et al., 2008).

Clinicians as well as health policy makers needed to develop tools for making prescribing and patient care more effective especially with regard to pharmacological intervention (Feder et al., 1999, Hewitt-Taylor, 2006, Woolf et al., 1999). The development of guidelines for clinical practice is perceived as a way of maintaining consistency in prescribing and narrowing the gap between what research data supports and what is prescribed. In addition to assist in prescribing, practice guidelines have also been used by some healthcare organizations to measure the quality of clinical care provided (Keeley, 2003, Berg, 1997).

The standard definition in the literature for clinical guidelines is the definition by the Institute of Medicine in the United States which states that guidelines are 'systematically developed statements to assist practitioners and patients decisions about appropriate healthcare for specific clinical circumstances' (Field and Lohr, 1990). From this statement it is emphasized that the main criteria for writing guidelines are 'systematic development', the joint decision between practitioners and patients and the 'specific' clinical condition (Keeley, 2003).

According to Meulen (2005) guidelines were rarely mentioned in the literature before the 1970s. The development of guidelines has gone through stages starting from the earlier less detailed 'protocols' of the seventies to the more evidence dependent guidelines of the nineties where more consideration was also given to quality of care, cost implications and the evidence from research (Meulen, 2005). Nowadays, the production and use of clinical guidelines is known to have become a familiar practice in different parts of Europe, North America and Australia (Shaneyfelt and Centor, 2009, Hewitt-Taylor, 2006).

In clinical practice there are care protocols as well as guidelines. In some cases the two words are used interchangeably. Both were argued to be sets of instructions to be followed by prescribers leading to what was referred to as 'a cookbook medicine' (Berg, 1997). Although both are required to be evidence based, a distinction does exist between the two (Hewitt-Taylor, 2006). Protocols are considered as a more obligatory set of comprehensive instructions to be followed than guidelines. In addition, the 'systemic' detailed approach in reviewing and presenting the evidence in guidelines is also considered to distinguish guidelines from protocols (Keeley, 2003, Meulen, 2005). In this study guidelines will be explored as different from protocols, considering them as a set of recommendations that serve as guidance for treatment rather than fixed rules, as may be the case with protocols.

2.6.1 Developing clinical guidelines

Guidelines are developed after a detailed, systematic and focused process of reviewing the scientific evidence available (Hewitt-Taylor, 2006, Shekelle et al., 1999). Before developing guidelines there are stages involved before a decision is made to construct them. These include first, identifying and agreeing on the need to develop a specific guideline, and then ensuring that having a guideline is the best way to approach the problem identified. The steps that lead to construction of 'good guidelines' include assessing the quality of the evidence available from clinical trials,

identifying critical outcomes required and ensuring that benefits from the studied intervention much outweigh any harm (Atkins et al., 2004).

Guidelines are usually constructed by multidisciplinary teams in which there is representation of different disciplines and different skills (Hewitt-Taylor, 2006, Shekelle et al., 1999). Not only healthcare professionals are included in these teams but the views of other individuals such as health-policy makers and financial experts are sought as cost is usually an important criterion in assessing the benefits of the treatment. Furthermore, involving patient representatives in guidelines committees is argued to be of importance in producing guidelines that can be implemented in practice.

2.6.2 Guidelines and evidence-based medicine

The use of clinical guidelines in medicine has been advocated based on the assumption that the information provided by these guidelines is derived from strong scientific evidence and hence will lead to evidence based practice or what is generally known as 'evidence based medicine' (EBM) (Keeley, 2003). By implementing guidelines in practice the perception is that evidence based treatment will be translated into practice (Hewitt-Taylor, 2006).

The term EBM was said to have made its first appearance in the literature in 1991 (Guyatt, 1991, Guyatt and John Cairns, 1992). Others argued that EBM is just a new view for an already old existing practice (Bystander, 2010). The great scientist Avicenna (or Ibn Sina) who died in 1037 was said to have written the first book in medicine known as 'Al-Qanun fi al –Tibb' (The law in medicine) which dealt with evidence based medicine and randomised controlled trials (RCTs).

Sacket et al (1996) defined EBM as 'the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients'. EBM has been considered to deal with the second

step in prescribing, after problem solving, by interpreting information from clinical trials to assist in the decision-making criterion (Elstein and Schwartz, 2002). The aim behind EBM as advocated is not to diminish clinicians' decision making, but to be used in conjunction with the prescribers' judgement and experience to make the most appropriate decision for the patient (Guyatt, 1991, Montori and Guyatt, 2008).

Different levels of evidence based on the different types of clinical trials design and the susceptibility to bias have been identified and are used in making different levels of recommendations in clinical guidelines (Shekelle et al., 1999). Randomised controlled trials (RCTs) and specifically meta-analysis of RCTs, which are based on systemic reviews of RCTs, have become the highest level of evidence to be considered when making guidelines especially with regard to effectiveness of treatment (Keeley, 2003, Sackett et al., 1996, Shekelle et al., 1999). Results obtained from RCTs will have a higher degree of recommendation in clinical guidelines than those obtained from non-randomised or uncontrolled trials. However, it has been argued that there are clinical care situations in which evidence based medicine from randomized controlled trials is considered not suitable in providing the desired effective patient care (Keeley, 2003). An example of these situations is the clinical care needed for patients in palliative care. One of the reasons described for the limitation of EBM in these situations is that qualitative research which might benefit this type of patients is not usually considered as a high level of evidence compared to RCTs to generate EBM. This can limit the effectiveness of clinical guidelines if only quantitative data are considered (Berg, 1997, Keeley, 2003).

For EBM to provide benefits, a number of perspectives need to be considered (Greenhalgh, 2010, Montori and Guyatt, 2008). These include the quality of evidence, the patient perspective and the nature of the particular healthcare system. The non-patient factors that may influence clinical decisions such as the nature of the healthcare system can be a

restricting element in providing evidence based-medicine (Hajjaj et al., 2010).

2.6.3 Benefits and challenges of guidelines

Although guidelines are adopted in healthcare settings in many parts around the world, there have been different arguments in favour or against the use of clinical guidelines (Berg, 1997, Woolf et al., 1999). In addition to the expected benefits, there are perceived challenges from clinical guidelines to the patients, the healthcare professionals and the healthcare system (Berg, 1997, Keeley, 2003, Shaneyfelt and Centor, 2009, Woolf et al., 1999).

The main reason for the use of guidelines in clinical settings is to improve the quality of healthcare (Woolf et al., 1999). Potential benefits for patients are expected from the use of clinical guidelines. Having information based on strong scientific evidence about effective treatment available to healthcare professionals, should improve patient health. This evidence-based information provided by the guidelines does not only assist prescribers in providing optimum treatment but can also assist patients making informed decisions about their treatment.

The main harm which can come from using guidelines is if they are developed from a misleading evidence from research (Woolf et al., 1999). Although guidelines committees are expected to critically appraise the evidence, this may not always avoid misinterpreting the evidence. This is perceived by the researcher to be true as there were situations in clinical practice where recommendations for the use of certain medications were changed. This was due to either further reviewing of the existing evidence or new evidence becoming available. This also makes it of importance that guidelines are continuously reviewed and updated based on the current evidence (Woolf et al., 1999). On the other hand, participants in clinical

trials may not always be representative of the population that need to be treated, for example, patients with comorbidities may not be included in trials, and thus following evidence derived from these trials may not only lack benefit but may well induce harm (Vinod, 2015).

It has also been considered that by referring to the available guidelines, prescribers will be more skilful in dealing effectively and appropriately specially with complex clinical situations (Berg, 1997). The other argument has been that the opposite may happen and prescribers, in the presence of guidelines, may develop less decision making skills (Berg, 1997, Berg, 2000). As the main aim of clinical guidelines is to benefit the patient, and as long as prescribing based on guidelines is improving patient care, it can be argued that the skilling or 'deskilling' of the prescribers debate should not be a reason to deprive the patients from the benefits of guidelines. Other educational measures can be adopted in doctors' training to ensure that the skills, assumingly affected by the presence of guidelines, are maintained.

The availability of guidelines has also been perceived to strengthen inter-professional communication and understanding (Berg, 1997, Currie, 2000). However, some argued that this may not always be the case (Atwal and Caldwell, 2002). Different healthcare professionals may have different views in how to assess, implement and achieve the desired goal for patient care (Atwal and Caldwell, 2002, McDonald et al., 2005). For example, it has been argued that nurses have a more rule-adhering attitude towards implementing guidelines than doctors and this may be a challenge when decisions are to be made that involve both doctors and nurses (McDonald et al, 2005).

The provision of uniformity of treatment is one of the most advocated reason for guidelines use (Woolf et al., 1999). This means that patients can receive the same type of treatment no matter by whom or where they

get treatment. However, one can argue that to fulfil this it may also be necessary to ensure uniformity of facilities in the health services in the first place. This can be expected to be a challenge in healthcare systems which are already struggling for example, in Sudan where this research was conducted.

It has also been argued that if guidelines are to lead to appropriate prescribing, they should be made with direct patient related needs prioritized over other non-patient related factors (Woolf et al., 1999). Paradoxically, the same authors have argued that guidelines may harm the healthcare organizations if treatment costs to the healthcare system, although a non-patient related factor, were not considered. It is expected that in making treatment recommendations cost-effectiveness is a core criteria to be taken into consideration. This balance between cost effectiveness and treatment effectiveness is considered by some as difficult to achieve (Berg, 1997).

In trying to resolve the above issue of the balance between the cost of treatment and its effectiveness, some guideline committees, for example NICE in UK, has been making decisions with regard to costly treatment by using the international measure of QALY (Quality Adjusted Life Years Measurement) (NICE, 2010a). In its simple meaning, QALY measures how many more years would a certain treatment give a certain patient and what quality of life is expected and compare this to the cost implication of the drug. Considering the above and acknowledging that the increasing cost of medical care is a challenge for many healthcare organizations, it seems that it will lie on the guidelines-making committees to maintain the balance between the patients' needs and the healthcare system needs, prioritizing the former as expected in making treatment recommendations. However, it will be difficult for healthcare professionals using the guidelines to determine that this has actually been the case.

Furthermore, a potential limitation for guidelines use is expected to occur if they are not flexible (Field and Lohr, 1990, Hewitt-Taylor, 2006, Keeley, 2003). Guidelines could be rejected if they put individualized patient care at risk. It is known from practice that even the best available guidelines or evidence could not be applicable to every patient (Greenhalgh, 2010, Sackett et al., 1996). Prescribers are thus expected to exercise autonomy in making decisions and weigh the perceived benefits from guidelines against the individual patients' needs. Prescribers are meant to consider the guidelines with the patient's best interest in the particular clinical circumstances to make their clinical decisions (Keeley, 2003). On the other hand, complete autonomy in clinical decisions can have its disadvantages as it could lead to irrational, incompetent and biased decisions (Armstrong, 2002, Gylling, 2004) .

2.6.4 Implementing guidelines

As mentioned earlier, recommendations provided by guidelines are considered as a way of assisting prescribers in providing treatment based on scientific evidence. Once these guidelines are written they need to be implemented into practice (Feder et al., 1999, Keeley, 2003). There are certain elements that are related to the guidelines itself and to the healthcare institution that need to be considered in order that these guidelines can successfully be translated into practice.

Some of the criteria that enhance guidelines implementation need to be considered at the early stages of guidelines development (Richter-Sundberg et al., 2015). For example, it is important that guidelines are produced in a way that is understandable and acceptable by the healthcare professionals required to use them. This may sometimes require getting feedback from those who are meant to use the guidelines

about its applicability to maximize the implementation of the guidelines (Scott et al., 2004). Furthermore, once the guidelines are ready for application and although it may sound obvious, prescribers need to be aware of their existence and capable of getting easy access to these guidelines.

In addition, to enhance application of guidelines, they need to be written with the recipients of the service in mind (Keeley, 2003). For example, to apply guidelines in clinical practice in developing countries there is a need to have guidelines that are suitable for such healthcare settings (Lindback et al., 2014, WHO, 2005a). Some international societies considered making what was referred to as global guidelines based on a level-wise approach to treatment that put in mind healthcare settings with limited resources (Fried and Krabshuis, 2008). However, the caveat with this approach as argued is that it may not provide optimal treatment and hence, affects the strength of the guidelines and even the idea behind EBM.

The World Health Organization (2007) explained in their guidelines for prevention of cardiovascular disease that guidelines should be developed to suit economic, social, and cultural in addition to medical circumstances. However, it is known to be a very difficult and costly process to develop new guidelines for each different group of recipients (Feder et al., 1999). One can thus assume that many healthcare professionals in different countries, especially those of limited resources and who want to follow guidelines for treating their patients, are likely to depend on foreign readymade guidelines. These foreign guidelines are not just about recommendations for drugs' use, but they involve other care aspects which may only be implemented when certain criteria are available in the particular healthcare system. In addition there are factors related to the culture of the society and the socio-economic state of the patients that can affect the implementation of these guidelines. This can be expected to be a challenge for many healthcare professionals especially in developing

countries who have to use foreign guidelines not made to fit their healthcare systems. This study is thus examining this issue by looking into the use of international guidelines by prescribers in Sudan.

2.7 Guidelines and professional status

There are different interpretations and definitions for what constitutes a professional behaviour (Hammer, 2000, Schafheutle et al., 2013). There may also be a cultural element in what a professional behaviour is expected to be. Professionalism is usually considered as a set of attitudes, behaviour and skills which when conducted by members of a certain occupation, elevate the status of such occupation and enhance trust and respect towards members of such occupation (Hammer, 2000, Schafheutle et al., 2013).

Guidelines have been considered by many as a means of enhancing the professional status of healthcare workers by providing the scientific-base, efficiency and the uniformity of treatment required to achieve healthcare of high quality (Berg, 1997, Hewitt-Taylor, 2006, Keeley, 2003, Woolf et al., 1999). Although clinical guidelines are usually written to be used by clinicians, other healthcare professionals are considered to benefit from the availability of guidelines (Woolf et al., 1999). Healthcare professionals, who form part of the team taking care of the patient, may provide a better contribution as part of a team when evidence-based guidelines are available. In addition, the new emerging advanced roles for other healthcare professionals such as nurses and pharmacists in healthcare may necessitate the change in perception about guidelines being mainly used by doctors.

On the other hand guidelines can be argued as harming professionalism by providing a set of instructions to be followed when treating patients and thus limiting personal judgement about how and what to do when dealing with different patients (Armstrong, 2002, Berg, 1997, Berg, 2000). It is interesting that the uniformity of treatment that is

promoted by guidelines use, is considered by some as a core to maintain professionalism while others consider it as a means of deskilling professionals. Although the importance of the prescribers' professional judgement cannot be denied, the risk from complete autonomy cannot be ruled out (Armstrong, 2002). Thus prescribers need to incorporate that external factor which is the evidence from research with their clinical judgement for a particular patient to make their final decision about treatment. In addition, it seems that those who have seen the benefit to their profession from using guidelines are demanding more from clinical guidelines. For example, to enhance the aspects of professionalism in the medical profession, it has been suggested that guidelines need to focus more on ethical issues encountered in clinical setting in order to improve how health prescribers deal professionally with such issues (Mertz and Strech, 2014).

Berg et al (2000) studied whether or not guidelines harm the professional autonomy of healthcare professionals by interviewing Dutch insurance physicians who were dealing with disability claims (Berg, 2000). The authors were interested in discussing the effect of 'objectivity' in using guidelines with regard to evidence from science in contrast to depending on 'subjective' practice in enhancing or endangering professionalism. Seven insurance physicians, in addition to eight co-ordinating physicians and seven managers were interviewed. Physicians as well as managers seemed to be positive about the use of guidelines in their practice. Guidelines were not considered to take away skills as long as they were not rigid; on the contrary they seem to help in making decisions and give power for professionals to stand by their decisions.

Although the above study found from some prescribers' views that guidelines can be used to enhance professional status rather than suppressing it, it may not have waived the argument against the use of guidelines as it is a very limited study. In addition, the participants in the study dealt with a specific situation with regard to disability claims in which

guidelines may have provided the physicians with a means of protection in addition to power to make their decisions about insurance claims.

In summary of the above, guidelines and specifically prescribing guidelines can be considered as serving the medical profession by presenting the best available options for treatment obtained from what is perceived as high quality clinical trials. In doing so the quality of patient care is likely to improve as prescribers will have the means and confidence to recommend treatments that have the potential to improve health outcomes. To achieve this, will depend on two factors; the quality of the guidelines presented which hugely relies on the people making the guidelines and secondly the best interpretation and rational use of these guidelines by healthcare professionals. If any of these two criteria are compromised the expected benefit from guidelines use will not be fulfilled.

Prescribing in cardiology as a clinical area is going to be used as an example to examine the use of guidelines in prescribing in Sudan. The main reasons for this choice is the increase in prevalence of cardiovascular disease in developing countries including Sudan where this research was conducted, and that cardiovascular disease is a discipline with an increasing number of guidelines that are constantly changing. There is also the element of the researcher's previous experience in working in cardiology wards. The above main reasons together with other aspects of cardiovascular disease will be examined in the following section.

2.8 Cardiovascular disease

Cardiovascular disease (CVD) includes a range of diseases affecting the heart and the blood vessels. These include coronary heart disease, rheumatic heart disease, congenital heart disease and cerebrovascular disease which affects the brain as well. Cardiovascular diseases are the main cause of death worldwide (WHO, 2011). Coronary heart disease and

stroke are considered as the main cardiovascular and cerebrovascular diseases and are seen by the World Health Organisation (WHO) as truly global epidemics (WHO, 2011).

In contrast to developing countries which will be discussed in the next section, death from CVD continues to fall across many countries in Europe ((ESC), 2012, Allender et al., 2008) . In the United Kingdom, although CVD is still one of the main causes of premature death, there is a steady decline in the incidence and fatality of the diseases across the last two decades ((BHF), 2012). The decrease in mortality and incidence of CVD is believed to be attributed, at least in part of it, to the increase in the use of medication for prevention and treatment of the disease as well as lifestyle changes with regard to diet, smoking and physical activity ((BHF), 2012, Smolina et al., 2012) .

2.8.1 Cardiovascular disease in developing countries

According to the WHO (2007), eighty percent of deaths from cardiovascular diseases occur in low and middle-income countries and occur equally in men and women. In sub-Saharan Africa, CVD is rapidly increasing and has a major socio-economic impact on societies (Abanilla et al., 2011, Suliman, 2011a). One of the major tasks listed by the WHO and its member states was to scale up cost-effective, integrated approaches for prevention of CVD. Based on the available health statistics from the developing world, the Institute of Medicine (IOM) projects that there will be a shift in the incidence of non-communicable diseases compared to infectious diseases, which is considered as the bigger health burden, in developing countries (Fuster, 2010).

The IOM supports the implementation of different strategies to reduce the risk of CVD in developing countries (Fuster, 2010). One of these strategies is to conduct research which is relevant to the developing

countries that can provide cost-effective approaches for CVD management. 'Resource-sensitive' programmes are considered to be required in low-income countries to reduce the prevalence of cardiovascular disease (Rabkin and Nishtar, 2011).

The increase in cardiovascular disease in the developing countries may be attributed to factors such as urbanisation and life style changes (WHO, 2011). It can also be argued that developing countries are not strongly getting the message about the danger from pre-disposing factors for heart diseases such as smoking and obesity. This increase in the prevalence of CVD in developing countries may be overlooked by governments because of many factors such as competing health issues especially infectious diseases, limited resources, lack of management and effective health policies (Fuster, 2010).

2.8.2 Use of guidelines in prescribing in CVD

Treatment of cardiovascular diseases is an area which is considered to be very much influenced by prescribing guidelines (Meulen, 2005). Advances in the management of heart disease are occurring as new drugs and cardiac techniques are discovered and hence updates in cardiology guidelines are expected to occur. Grilli et al (1994) did an earlier review into the published literature of compliance with clinical practice guidelines between the years 1980-1991. They claimed from their review that cardiology and oncology were the specialities in clinical practice which had a high compliance with practice guidelines. The reason for that was unknown but the researchers seemed to be inclined to relate part of the reason for this to the quality of the guidelines available in these two disciplines. Although this is an older review and things may have changed during the last two decades, it gives an insight into the strong influence of guidelines in prescribing in cardiology.

The World Health Organisation (WHO), the European Society of

Cardiology (ESC), the American College of Cardiology (ACC), and the National Institute of Clinical Excellence (NICE) in UK are examples of health societies and organizations that have written guidelines recommending the use of certain medications to reduce morbidity and mortality from heart disease (Hamm et al., 2011, NICE, 2010b, Smith et al., 2006, WHO, 2007b). Most of these recommendations were said to be based on high levels of evidence from clinical research; that is evidence from randomised controlled trials (RCTs) and systemic reviews of RCTs. Although there are different types of drugs recommended by these guidelines based on the type of disease, the main classes of drugs that are usually recommended are antiplatelets, angiotensin converting enzyme inhibitors, angiotensin enzyme antagonists, cholesterol lowering drugs, B-receptor blockers, blood thinning agents and drugs regulating heart rhythm. A combination of these drugs is usually required, according to the guidelines, to be prescribed for heart disease patients.

Developing countries may benefit from the proven effective clinical interventions usually promoted by guidelines that are used in high-income countries to manage CVD (Joshi et al., 2008). However, the patients in the developing world are the ones who are likely to have limited access to these interventions and thus they may be missing the lifesaving medications promoted by these guidelines.

2.9 Sudan, cardiovascular disease and the use of guidelines

2.9.1 The Republic of Sudan

Sudan is a multi-ethnic-multicultural country with hundreds of ethnic tribal religions and languages located in the northern-eastern part of Africa (Ministry of Cabinet Affairs, 2008). The country occupies the middle part between Africa and the Middle East. It is currently the second largest country in Africa with a total area of about 1.882 million square kilometres and an estimated population in 2011 of about 33 million. It is classified by

the World Bank as a developing country with income status of low to middle ((WB)), 2015).The majority of the published data about Sudan refers to the Sudan before the split of the country into two in July 2011. In addition, as in many less developed countries the epidemiological information about diseases in Sudan are scarce (Suliman, 2011a). The country is made up of 15 states with Khartoum state being the capital which in previous estimates was said to contain 20% of the population (Ministry of Cabinet Affairs, 2008). This figure is continuously rising as more people are moving to the capital from other states.

2.9.2 Access to healthcare in Sudan

In Sudan both public and private sectors provide healthcare. Since the independence in 1956, the Sudanese government has offered free health services including free supply of medicine (Ministry of Welfare and Social Security, 2010). However, the government was faced with a variety of political and economic problems that made the increasing cost of health care a huge burden. This has led to the deterioration of the health service provided and the government started to charge for many of the services provided in its hospitals. With the support of the WHO the government has created a health insurance scheme which launched its first service in 1995. The government health insurance targets the sector of the population who cannot afford to pay treatment costs but it is open to all members of the community. According to the information from the National Health Insurance Fund, the scheme in 2010 covered 39% of the population (Ministry of Welfare and Social Security, 2010).

The government Health Insurance Scheme (HIS) is funded through a variety of resources in addition to those insured by the scheme (Ministry of Welfare and Social Security, 2010, Mohamed, 2007). Through this scheme the government should ideally cover the cost of treatment for the retired, poor people and full time students. The HIS covers different types of medical consultations, admissions, and surgeries and is also said to

cover 75% of the cost of the medicines on its list of essential drugs. Not all drugs are available through the scheme according to individual reports from patients who have joined the scheme. There is also restriction on the branded drugs and usually cheaper generic drugs are covered by the scheme. During the time of data collection in Sudan, there was a continuous advertisement in the media encouraging people to enrol in HIS. The government is also calling for the financially advantaged sector of the population, to contribute as a charity to HIS, so that the government can cover healthcare costs for as many needy patients as possible.

The private sector has expanded rapidly in Sudan and especially in Khartoum in the last decade (EMRO, 2006, Federal Ministry of Health, 2010). Private profit-making health services are perceived by the public to be of better quality than government services. These services are situated mainly in urban areas, mainly the capital, and usually accessed by the better-off. Private health insurance schemes are also available in Sudan and are known to provide almost comprehensive cover for those enrolled in these schemes. There are some private non-profit health care services provided by non-government and faith organizations but they are mainly based in areas of the country affected by conflict and to a lesser extent in the capital Khartoum (Federal Ministry of Health, 2010).

In Sudan, until recently patients could choose for themselves which health centre or hospital they wanted to receive medical treatment in. The government provide health services through its secondary care sector, that is the hospitals, and the primary care sector, that is health centres. However, it is the perception of the researcher that to say there is a link between the two sectors which can enable exchange of information is very much debatable. Transfer of medical information and follow up of treatment remain as the responsibility of the patient or patient carers. This perceived lack of information transfer between primary and secondary care is probably one of the major obstacles in providing a high quality healthcare practice in Sudan.

2.9.3 Incidence of cardiovascular disease in Sudan

Most of the information obtained about Sudan and its health service was obtained from the WHO and some government reports in Sudan. Statistics from the WHO (2006) and the Sudanese Federal Ministry of Health (FMOH) (2007) showed that heart diseases are the fourth cause of mortality in hospitals after malaria, pneumonia and septicaemia in Sudan. Heart failure was listed separately from heart disease as the sixth cause of mortality in hospitals in Sudan (EMRO, 2006). According to an annual health report from the FMOH, Khartoum state, the capital of Sudan, had the highest percentage of death recorded from CVD in 2007 compared to other states of Sudan but at the same time it has got all the main tertiary centres for heart diseases in the country (Federal Ministry of Health, 2007). The report did not identify if these deaths are actually from patients who are resident in Khartoum or from those coming from outside the capital seeking treatment in the cardiac centres of Khartoum.

Data obtained from the Department of Non-Communicable diseases in the State Ministry of Health in Khartoum showed a drop in deaths from CVD in Khartoum from 2007 to 2009; but it is still the highest cause of deaths compared to the other non-communicable diseases in Khartoum medical units. The same report also describes that the majority of doctors registered as specialised in cardiology in Sudan are known to be based in Khartoum. The figure provided for the number of registered cardiologists in this report is known to have increased as more cardiology specialists working in Khartoum's main cardiology hospitals were identified during this study.

There were few studies found in the literature which relate to the current state of cardiovascular disease in Sudan. In 2011, Suliman, a cardiologist in the country's main non-private tertiary cardiac centre, Alshaab hospital,

in Khartoum, conducted a review on the data available concerning the state of heart disease in Sudan. The data was gathered from different sources including statistical reports by the FMOH in Sudan, the WHO, and from Sudan House Hold Survey (SHHS). Cardiovascular disease was reported in the top ten causes of death in hospitals in Sudan between 1998 and 2008. In 2006, the disease affected 2.5 % of the population in Sudan and the prevalence of diseases which can predispose to cardiovascular disease such as hypertension and diabetes mellitus was 20.1% and 12.7 % respectively. Although there is a need for more studies to be conducted especially in the community about the prevalence of cardiovascular disease, the available information indicates the need to initiate awareness of the risk factors and the preventative measures for cardiovascular disease in Sudan. In a different study the author also examined the pattern of patients' admissions into Alshaab Hospital which the main government cardiology centre in Sudan (Suliman, 2011b). The admissions from ischemic heart disease to Alshaab hospital during a 6-month period constituted 67% of the admissions to the hospital. These included acute coronary syndrome (ACS) and heart failure. ACS constituted the main admission to the coronary care unit while heart failure comprised the main admission to the wards.

In another study, a population-based survey into the risk factors of ischemic heart disease in Khartoum was carried out by the WHO between the years 2005 and 2006 (Eltom, 2006). A total of 1573 people participated in the study, age between 25-64 yrs. The overall response rate was 98%. Low physical activity was found to be a factor in 86.6 % of the population, overweight and obesity, 53.9 %, hypertension, 23.6%, high cholesterol, 19.8%, diabetes, 19.2 % and smoking 12%. Based on these findings, it is thus of great importance that interventions for primary and secondary prevention of heart disease are implemented in Sudan (Suliman, 2011a).

2.9.4 Use of guidelines in prescribing in Sudan

There is limited information available from the Federal Ministry of Health (FMOH) in Sudan and the Sudan Medical Council that indicates any specific policies with regard to the use of guidelines in prescribing. However, there is a reference to the use of guidelines in Sudan National Drug policy (2005-2009) to promote rational use of drugs (Federal Ministry of Health, 2005) . One of the strategies that has been suggested to ensure rational prescribing is for the FMOH to publish standard treatment guidelines.

Few studies were available in the literature about the implementation of guidelines in Sudan. These studies examined the implementation of the international guidelines in some areas of clinical practice in Sudan which implies that prescribers in Sudan are considering the use of guidelines in their clinical practice (Abdelwahab et al., 2013, Elamin and Abu-Aisha, 2011, Elmardi et al., 2009, Salih et al., 2014). With regard to the possibility of implementing guidelines in Sudan, the World Gastroenterology Organization in an attempt to make global guidelines which can be applied in developing countries, has referred to a number of gastroenterologists in Sudan who found that some of the investigational and management approaches recommended by the international guidelines were difficult to be applied in Sudan due to their high cost (Fried and Krabshuis, 2008). This also indicates that in Sudan prescribers are trying to follow available guidelines but may be facing difficulties in doing so.

As an example, Salih et al (2014) examined the implementation of the WHO guidelines in the treatment of community acquired pneumonia in 208 children admitted with pneumonia to the main children hospital in Khartoum in the period from June 2009 - July 2010. The study found that only 39 children (18.8%) received antibiotics recommended by the WHO guidelines. There was no link between patient variables and non-adherence to guidelines therapy. The patients were followed up after 48

hours. There was no difference in response based on fever, respiratory rate and food intake between prescribing based on guidelines and prescribing not based on guidelines. This is important as resistance to antibiotics as a result of non-rational use of antibiotics is a serious problem worldwide. However, the study did not examine the reasons behind such non-compliance. Many reasons might be involved in the non-adherence to guidelines including the junior doctors' unawareness of the guidelines, or the senior doctors who are usually providing the training were not for any reason following the guidelines.

There was no study found that looked into guidelines use in cardiovascular disease in particular or investigated the attitudes of prescribers towards the use of guidelines in practice in Sudan. Considering the prevalence of the disease in Sudan and the number of international cardiology guidelines available that are promoting life-saving treatment for patients with CVD, this research aims to investigate the views of doctors working in two of the main cardiology hospitals in Sudan about the use of guidelines in prescribing.

2.10 Clinical pharmacy and the role of pharmacists in patient care

The following part of the review discusses the involvement of hospital clinical pharmacists in patient care.

2.10.1 Involving pharmacists in disease management

Although providing treatment is a role traditionally linked with physicians, the increasing number of medicines becoming available, the more widespread chronic diseases coupled with more recommendations for drug use from clinical guidelines and the availability of powerful medications that require monitoring, all mean that the sole responsibility of therapeutic treatment for patients no longer ensures safe and effective use

of medicines (Weidenmayer et al., 2006). The involvement of other healthcare professions, with the physicians, is considered to be required in order to achieve the desired outcomes from prescribing (Hepler and Strand, 1990).

Some healthcare organizations have acknowledged that one strategy for influencing prescribing is having clinically trained pharmacists involved in patients' therapeutic management (Calvert, 1999). Pharmacists with their expertise have the potential to contribute to achieve safe and effective use of pharmacological interventions. For example, it was reported that the most common drug related errors happening in acute coronary syndrome patients were drug omissions and dose errors (Michaels, 2010). A number of studies reported the value of having the pharmacist as part of the team providing patient care in ensuring optimization of therapy based on recommendations from guidelines for heart disease patients (Chinwong et al., 2004, Axtell et al., 2001, Gattis et al., 1999). These findings support the involvement of pharmacists in disease management. However, a wider recognition from healthcare organizations to the potential of the pharmacists is expected to occur only if the pharmacists themselves take the initiative to be directly involved in patient care and acknowledge their responsibility in ensuring safe and effective prescribing (Weidenmayer et al., 2006) .

According to the International Pharmaceutical Federation (FIP) report in 2006, pharmacists were the third largest healthcare professional group globally after doctors and nurses. Their distribution based on health sector and geographical region was uneven (Chan and Wuliji, 2006). The majority of pharmacists were working in the retail sector followed by hospitals. Countries most affected by the shortages of pharmacists were found to be in sub-Saharan Africa.

2.10.2 Clinical pharmacy

The role of pharmacists has changed dramatically over the past years. Since the preparation of drugs was taken over by the pharmaceutical industry, pharmacists had to identify a new role that can make use of their expertise and remodel their profession (Hepler, 1985, Hepler, 1990, Hepler and Strand, 1990). This necessitated the need for pharmacists to move from their traditional compounding and drug supply roles towards new roles that are more patient than product focused.

The clinical practice of pharmacy in its simplest form was described as applying drug related knowledge while considering all areas related to the patient medical condition (McLeod, 1976). In this sense, clinical pharmacy does not need to be linked with certain settings and thus can be practised by pharmacists whether they are working in community or hospitals. However, the word 'clinical' at least by definition may imply that the practice is mainly linked with pharmacists working in clinical settings (Francke, 1969).

With regard to clinical pharmacy practice in hospitals, the role of pharmacists in the hospitals by the patient bedside has been argued to be the only way to maintain the pharmacy profession (Anderson, 2004). This move towards clinical roles in hospitals has enhanced the concept of professionalism in pharmacy (Hammer, 2000, Schafheutle et al., 2013). The clinical movement has also led pharmacy educators to consider the need of stressing the importance of teaching the concept of professionalism to the undergraduate pharmacy students (Schafheutle et al., 2013).

It is considered that the main attributes of professionalism such as knowledge, skills, accountability, autonomy and the sense of identified 'mission' of the pharmacist can only be achieved, displayed and maintained when pharmacists are working with other healthcare staff as well as with patients in clinical settings (Anderson, 2004, Hammer, 2000).

The perception is that if pharmacists use their knowledge only for supplying medicines, they may face the risk of deprofessionalization as this duty can be performed by the lay person (Hall, 2013). In addition, the professionalism of pharmacy was also argued against based on the fact that as long as pharmacists are working based on instructions from another professional, that is the doctor, they do not exercise full autonomy (Hall, 2013).

2.10.2.1 Development of clinical pharmacy

The use of the term clinical pharmacy is thought to have developed in the 1960s in the United States in association with pharmacy practice in hospital settings (McLeod, 1976, Hepler and Strand, 1990). However, the practice of joint work between the pharmacist and the doctor to provide patient care is believed to have started many centuries ago in Europe (McLeod, 1976). It was also believed that the duty of some of the apothecaries in the seventeen and eighteen centuries in parts of Europe and US was reported as not only to supply drugs but to advise on medication and in some cases join the physicians in their visits to their hospital patients.

The development of clinical pharmacy in the United States (US) and the United Kingdom (UK) was attributed to the rise in medication errors on the wards which led pharmacists to move from their pharmacies to provide ward based services (Cousins, 1995, McLeod, 1976). McLeod (1976) explained that in addition to medication errors, the introduction of the unit dosage form of drugs and the drug information centres which developed in the 1960s, led to the flourishing of the clinical pharmacy service in US. This is in spite the fact that clinical practice by some pharmacists was documented as early as 1940s.

In the UK, an increase in medication errors led to the change in the way drugs were prescribed, then transcribed by nurses and later administered to the patients in hospitals in the late 1960s (Cousins, 1995). The appearance of pharmacists on the wards to check the prescription and administration record led to a considerable reduction in medication errors. Cousins and Luscombe (1995) made a distinction between the former ward based service of pharmacists and the later clinical pharmacy service that appeared in the late seventies in UK hospitals when pharmacists joined the doctors' ward rounds. The development in clinical pharmacy is known to have existed within hospitals before the establishment of clinical pharmacy education in pharmacy schools. In the United States, Mcleod (1976) described that despite earlier attempts from some hospital pharmacists in the 1930s and 40s to include clinical training for undergraduate pharmacists, the official clinical pharmacy training started in the sixties in some pharmacy schools in the US. In the United Kingdom, in the late 1970s, postgraduate qualifications in clinical pharmacy were developed (Cousins, 1995).

The practice of clinical pharmacy although becoming a routine in North America and UK, is in its first stages in many countries in Africa and the Middle East. In some countries, for example UK, becoming a clinical pharmacist is only the first step in the clinical hospital pharmacy career. Clinical pharmacists progress in their clinical career to become specialized in particular clinical areas, for example, cardiology, antimicrobial therapy, intensive care and different other specialities. However, having specialised pharmacists in clinical settings was said to have started very much earlier as the clinical pharmacy profession was developing (McLeod, 1976). Paediatrics was described as one of the first clinical areas in the US to have specialized pharmacists. The reason for that was considered to be the general willingness of the paediatricians in hospitals to get the support from drug experts that is the pharmacists, in managing children illnesses.

The evolving designed role of the clinical pharmacist has shared many similarities for the last four decades. Brodie in 1970 described the role of the clinical pharmacist in improving drug utilization. The pharmacist was expected to check prescriptions, medications use, maintain drug profiles of patients, make treatment plans with the physicians, provide drug related information and to work as part of the healthcare team (Brodie, 1970, McLeod, 1976) . The American College of Clinical Pharmacy (ACCP) (2014) recently published the standards of practice for clinical pharmacists. These included most of the pharmacists' roles mentioned by Brodie (1970) such as reviewing medication record, assessing prescribed therapy, working with the healthcare team and providing advice to patients. The ACCP has in addition included the importance of maintaining professionalism attitudes such as competency, integrity and dealing with ethical issues in practice. This implies that the aim behind clinical pharmacy practice has been consistent in being a patient focused service and for clinical pharmacists to be part of the healthcare team. This is not only important to maintain a consistent service but also for other healthcare professionals to understand the role of clinical pharmacists (Calvert, 1999). In addition, most of the published literature examining aspects of hospital pharmacy practice used most of these above roles as expected roles of hospital pharmacists (Awad, 2007, Smith et al., 2002, Tahaine et al., 2009, Zaidan et al., 2011) . Some of these roles such as detecting prescription errors, reviewing patient medication record, counselling patient and provide advice to other healthcare professionals were considered in this study when examining the role of clinical pharmacists in hospitals in Sudan.

2.10.2.2 Clinical pharmacy, a speciality or the change to be embraced

Since the emergence of the term clinical pharmacy in the sixties, different definitions has been considered for the term but all have widely

shared the concept of the 'patient-oriented' pharmacy service (Francke, 1969). In recent years different pharmacists' associations have provided different definitions for clinical pharmacy practice.

A detailed definition of clinical pharmacy by the American College of Clinical Pharmacy has stated that 'Clinical Pharmacy is a health science discipline in which pharmacists provide a patient care that optimizes medication therapy and promotes health, wellness, and disease prevention. The practice of clinical pharmacy embraces the philosophy of pharmaceutical care; it blends a caring orientation with specialized therapeutic knowledge, experience, and judgment for the purpose of ensuring optimal patient outcomes. As a discipline, clinical pharmacy also has an obligation to contribute to the generation of new knowledge that advances health and quality of life' ((ACCP), 2005).

The European society for clinical pharmacy has defined clinical pharmacy as ' A health speciality which describes the activities and services of the clinical pharmacist to promote rational use of medicines [...], it includes all services performed by pharmacists in any setting, hospitals, community pharmacies, nursing homes or home-based services where medicines are prescribed and used' (European Society of Clinical Pharmacy, 2010) .

Furthermore, the term 'clinical pharmacy' has been described by the International Federation of Pharmacists (FIP) in 2006 as 'The work of pharmacists whose primary job is to interact with the health care system, interview and assess patients, make specific therapeutic recommendations, monitor patient responses to drug therapy and provide medicine information' (Weidenmayer et al., 2006). As this research is examining the role of the clinical pharmacist in hospitals in particular, this FIP definition will be the one to embrace for this study.

Other definitions for clinical pharmacy by different pharmacy bodies exist which raise the question about if clinical pharmacy is a speciality linked to practice in certain settings, is it complementing pharmaceutical practice or is it the change that pharmacy practice had to embrace and thus any pharmaceutical care should involve clinical pharmacy practice (Hepler, 1985, Hepler and Strand, 1990, McLeod, 1976, Smith, 2007, Provost, 1972).

The above argument can be very much linked with the undergraduate education that pharmacists receive in different parts of the world. If schools of pharmacy cannot provide clinically oriented teaching for different reasons to the undergraduates, which is the case in many pharmacy schools around the world, pharmacists will continue to provide their classical drug oriented service. In such situations clinical pharmacy will be considered a speciality which requires post graduate training. Accordingly, it will be expected that only a fraction of pharmacy graduates will get the chance to undertake post graduate studies in clinical pharmacy. In such case scenario, clinical pharmacy practice will be practised in certain settings where these specialized pharmacists are available which is the case in some countries around the world. For example, in Sudan where this study was conducted, clinical pharmacy practice is currently a speciality whereby only pharmacists who undertake a post graduate degree in clinical pharmacy can practice as clinical pharmacists in hospitals.

The above lack of integration of clinical education into the undergraduate pharmacy course caused earlier concern that having two tiers of pharmacists, clinical and non-clinical could endanger pharmacy practice (Provost, 1972). It was even suggested that both tiers should not be referred to as pharmacists for the sake of the profession and the public, as they will be providing different levels of service. The argument which can be put forward for the above concern is that there are different areas where pharmacists can practice where they are not in contact with patients

and hence there may be very limited use of the clinical skills, for example in industry. These areas may more benefit from pharmacists who have strong classical pharmacy education than those with mainly clinically oriented background. This however, does not negate the need for a certain level of clinical education integrated into the undergraduate pharmacy course which can be further developed after graduation based on the pharmacist preferred area of practice.

Clinical pharmacy services are rapidly developing in many hospitals in the Middle East and some African countries due to more pharmacists now being trained as clinical pharmacists (Kheir, 2013, Mekonnen et al., 2013). The defined practice of clinical pharmacy in hospitals is quite a new area for pharmacists in Sudan and is going to be examined in this study.

2.10.2.3 Clinical pharmacy and pharmaceutical care

The concept of pharmaceutical care is believed to have projected in the early nineties (Calvert, 1999). Some authors made a distinction between clinical pharmacy practice and provision of pharmaceutical care (Hepler and Strand, 1990, Smith, 2007, LeBlanc and Dasta, 2005). The goal of clinical pharmacy is thought to be that patients should get 'clinical drug knowledge from the pharmacist that improves patient care' (Smith 2007), while pharmaceutical care is defined as 'the provision of drug therapy to achieve definite outcomes and improve patient's quality of life' (Hepler and Strand, 1990). It has been argued that it is the 'outcomes' linked with the definition of pharmaceutical care that have made the distinction between the two terms (Hepler and Strand, 1990, Hepler, 2004). However, both definitions share the idea of patient care and thus can be considered as referring to one concept. The ACCP (2005) definition of clinical pharmacy is that it 'embraces the philosophy of pharmaceutical care'.

On the other hand, there seems to be claims that suggest wider differences between the two concepts that can have a negative impact on clinical pharmacy practice (Hepler, 2004). For example, there has been a claim that clinical pharmacy is a pharmacy service directed mainly to clinicians in contrast to pharmaceutical care that is directed to patients (Smith, 2007). This claim against clinical pharmacy may be due to an underlying resistance to change coming from those, whether pharmacists or other healthcare providers, who are used to a specific type of service from pharmacists and are not willing to accept the new clinical service for personal related or organizational reasons.

The dispute about whether pharmaceutical care and clinical pharmacy are different or not relied for part of it on some of the definitions that have been provided for the two terms. However, it can be considered that although these definitions help to provide a means of identifying the different concepts it may not be possible to accept the definitions as encompassing all aspects of either clinical pharmacy or pharmaceutical care.

Hepler (2004) discussed different scenarios for the link between pharmaceutical care and clinical pharmacy but with strong argument that both can be considered as describing a shared goal of pharmacy practice which is the effective and safe use of drug therapy. The different scenarios were used to describe situations where clinical pharmacy practice can be applied but without achieving pharmaceutical care and vice versa. There were also work scenarios described where both clinical pharmacy and pharmaceutical care can be achieved. The main point that has been argued by Helper is that pharmaceutical care is a broader concept than clinical pharmacy that may go beyond what pharmacists can do, and to achieve it, unlike clinical pharmacy, it may include other healthcare professionals and involve other factors related to the healthcare system. Considering the above, one agrees with such a claim that clinical pharmacy is part of a larger concept of pharmaceutical care and ideally

any pharmaceutical care will involve clinical pharmacy practice. However, different to Hepler's suggested scenarios, it can be argued that pharmacists working in different settings whether in community or in hospital, can provide different levels of what can be referred to as pharmaceutical services in all circumstances, but not all services can fit the definitions of 'clinical pharmacy' or 'pharmaceutical care'.

2.10.2.4 Clinical pharmacy and hospital pharmacy

A different distinction also needs to be made between hospital pharmacy practice and clinical pharmacy practice. It is the perception of the researcher that many healthcare settings in different countries have got their own criteria with regard to the two types of practice. Whereas clinical pharmacy is considered as one branch of hospital pharmacy practice for some, the idea that all appointed hospital pharmacists should be able to practice clinical pharmacy is applicable in some other healthcare settings. In spite of the above, it is still difficult sometimes to assess from the literature that a distinction was made between hospital and clinical pharmacy practice. This is important as this research is particularly looking into clinical hospital pharmacy practice.

A review was conducted in 2005 into the published data about international hospital pharmacy practice (1996-2004) using Medline and other internet sources (LeBlanc and Dasta, 2005). The review considered the available published information about international hospital pharmacy practice as very scarce. The authors also found difficulty in identifying hospital pharmacy practice from clinical pharmacy practice or pharmaceutical care. For the sake of their review, the authors decided to go for any 'patient-oriented services' provided by the pharmacists in hospitals as the inclusion criterion.

In the review, some hospital practices were found to be more advanced than others with regard to the involvement of pharmacists in patient-care; this was usually happening in developed countries. Similar obstacles were shared by pharmacy practice in different countries especially developing countries including shortage of pharmacists, limited resources, financial restrictions and drug supply. What the review identified from the limited data from different countries was that there were similarities as well as differences between hospital pharmacy practice not only between different countries but within the same country. One can expect that the 'inter-country' variation in practice is likely to occur in countries where it is difficult to standardize healthcare. This can be especially true in countries with struggling healthcare infrastructure.

In a similar attempt to examine international hospital pharmacy practice, a world-wide survey was conducted in collaboration with the International Federation of pharmacists (FIP) in 2009 (Doloresco and Vermeulen, 2009). The survey examined different aspects of hospital pharmacy practice within each of the 192 countries which are members of the United Nations. Eighty-five responses were received providing a response rate of 44%. Respondents for the survey were chosen by their national pharmacy organizations according to their capability of understanding the nature of hospital pharmacy practice in the country. One reply from each country was accepted. The survey results have shown differences in the type of hospital pharmacy service available in different countries. The relationship between the hospital and the pharmacist was divided into three categories; high, medium and low, based on the pharmacist involvement in therapy management. The 'low category' was found to be the highest with a mean response of 41%. In this category pharmacists were found only to be involved in drug supply. In the 'high category' (31%), pharmacists were found to be involved in the whole process of medication use that is not only product supply. In between the two levels of service was the 'medium category' (11%) where the pharmacists available were not actually part of the hospital staff but come to manage some medication related services. No hospital pharmacy service was also reported (13%).

The above study showed that there were some similarities in the obstacles facing hospital pharmacy practice in many countries including lack of enough hospital pharmacists and lack of training. In addition, lack of essential medicines and ease of access to electronic information was shared by many nations especially those in the developing countries. With regard to influence on prescribing, the study found that in 65 (77%) nations pharmacists were involved in making decisions about hospital formularies.

There are several limitations to the above study. The majority of the respondents (74%) were said to have used their 'personal impression' to reply to the survey questions and not information evident from practice. In addition, a major limitation for the study is that it depended on a particularly allocated respondent or respondents to describe the nature of hospital practice in the participating countries and this may have resulted in biased information. More studies are required to investigate the actual practice of hospital pharmacists, especially in areas where clinical pharmacy practice is a new area of practice, and the obstacles facing those pharmacists in order to understand how to improve practice.

2.11 Clinical pharmacists' interventions and use of guidelines

A large number of studies that were conducted in UK and US hospitals found that the involvement of clinical hospital pharmacists in patient care had a positive impact on the patients' health (for example, (Anderson et al., 2010, Miller et al., 2011, Bond et al., 2001, Boyko et al., 1997, Howard et al., 2003, Leape et al., 1999, Alison Dale, 2003, Horning et al., 2007)). Furthermore, it has also been suggested that hospital pharmacists' impact can be greater if they can provide input at the time of prescribing which usually takes place on the hospital wards (Anderson et al., 2010). This is achieved most of the time in hospitals where there are pharmacists

present as members of the patient healthcare team. Even in some developing countries where clinical pharmacy is a new practice, the positive value of clinical pharmacists' interventions on the wards was identified (Mekonnen et al., 2013).

As adherence to clinical guidelines is expected to improve morbidities and mortalities, Horning et al (2007) studied the role played by pharmacists in ensuring that guidelines medications were prescribed. The study compared the effect of having consultant pharmacists providing what was referred to as 'diseases management services' which particularly aimed to make therapeutic recommendations that increase adherence to guidelines versus patients receiving what the authors defined as 'traditional drug review service' which is usually focusing on dosing errors and side effects of drugs. The study involved 411 patients in six long term care facilities for the elderly. Two of these facilities (107 patients) were receiving disease management pharmacy service while the rest (304 patients) were getting 'traditional' pharmacy service. The researchers conducted retrospective drug chart review focusing on seven chronic diseases; diabetes, coronary artery disease (CAD), heart failure, osteoporosis, stroke, hypertension and hyperlipidaemia by comparing drugs prescribed, pharmacists' recommendations and current practice guidelines.

The above study found significant improvement in prescribed guidelines medication in patients who received disease management service in four of the chronic diseases, CAD, HF, diabetes and osteoporosis. For stroke, hypertension and hyperlipidaemia there was no difference in adherence to guidelines medication compared to those patients receiving traditional drug review service. Pharmacists providing disease management services were found to be more likely to make therapeutic recommendations than those providing 'traditional' drug review service. However, the findings may also suggest that there is a role for both types of pharmacy services in ensuring implementation of guidelines therapy. In addition, the clinical

areas which showed no difference in adherence to guidelines can indicate that some guidelines were more followed by doctors than others for different reasons that had to do with the particular clinical area or the easiness of following particular guidelines.

The study has its limitations considering that some of the authors were actually the pharmacists doing the diseases management service and thus the bias effect from these pharmacists recording their own work cannot be ruled out. In addition, the findings depended on documentation which according to the authors was very variable. In spite of these limitations, the study as argued by Summers (2007) can be of value not only to pharmacists but to healthcare organisations who are seeking ways to improve adherence to guidelines.

It is also worth mentioning that a review into the quality of the published data between 1990 and 2009 about positive outcomes from pharmacists' interventions, rated the quality of the data from moderate to poor (Melchioris et al., 2012). The reviewers considered the studies obtained from different online resources as requiring improvement in methodological aspects and study design. This implies that more studies need to be conducted in order to strengthen the argument that pharmacists' involvement does make a measured and valued difference in patient care.

Another review into the effect of clinical pharmacists on hospitalized patients examined 343 publications between 1985 and 2005 but included only 36 articles (Kaboli et al., 2006). The exclusion criteria were non-clinical trials, outpatient and paediatrics clinics, no clinical pharmacist intervention and no comparison or control groups. The review, albeit, found general improvement in health outcome with no harm to the patients due to pharmacists' interventions, identified the need for more research including larger samples and more reporting of pharmacists' interventions in order to support the benefits of clinical pharmacists' interventions to patient care.

Bearing in mind the above limitations in clinical pharmacy studies, the information provided by the studies looking into the effect of pharmacists' interventions on patient care can still be considered of value not only to pharmacists but to the whole healthcare system. For example, in UK, the role of pharmacists in minimizing drug errors is already being documented in official reports (Commission, 2001, Smith, 2004) . In addition some of the studies, for example, Horning et al., 2007, provided an indication of the positive effect of having pharmacists in ensuring that guidelines therapies were prescribed. This implementation of clinical guidelines can thus benefit the patients as well as the healthcare system. There is no doubt that pharmacists are the healthcare professionals with the maximum knowledge in the use of medications. Pharmacists are expected to have a positive role to play in patient care as individuals and as part of a team (Calvert, 1999). However, considering some of the argued limitations in the studies examining positive outcomes from pharmacists 'involvement in patient care, more research is required to emphasize the positive contribution of pharmacists to healthcare.

Although studies were conducted to show how pharmacists can help in adherence to guidelines, the influence of having clinical guidelines on the practice of clinical pharmacists was rarely studied. Wolf et al (1999) has argued that guidelines not only assist prescribers, but other healthcare professionals in providing healthcare based on evidence. The influence of availability (or unavailability) of guidelines in assisting hospital clinical pharmacists performing their clinical role is going to be examined in this study.

2.12 Hospital pharmacy practice in Sudan

The total work force of pharmacists in the public sector in Sudan was estimated to be 26% in 2007 (Directorate of Pharmacy, 2007). Out of 712

pharmacists working in the public sector, that is two pharmacists per 100,000 of population, 341 pharmacists were employed in hospitals which constitutes around 49% of the pharmacists in the public sector in Sudan. Thus the average pharmacy workforce in hospitals in the public sector in Sudan is about 12 %. Although these figures only refer to pharmacists in the public sector, they are comparable to the average global pharmacy work force in hospitals in 2006 which was reported to be about 15% (Chan and Wuliji, 2006).

In 2006 the Federal Ministry of Health in Sudan, which is responsible for the development of national policies and strategic plans, acknowledged the need for developing pharmaceutical services in hospitals (Directorate of Pharmacy, 2006). With the help of the Directorate of Pharmacy, a new policy regarding hospital pharmacy was included in the pharmaceutical strategic plan for the period of 2005-2029. This emphasized the need to develop hospital pharmacy in Sudan so that it can stand up to the changes and challenges in healthcare nationally and internationally.

In addition, a review conducted in Sudan and published by the WHO about rational drug use in Sudan, found a decline in rational drug use in Sudan due to inappropriate prescribing, guidelines not being followed and patient self-medicating (Awad et al., 2007b). Some of the strategies that were suggested in the review to improve appropriate medicine use included joint work between different health care personnel, education, audit and increase involvement of pharmacists with clinical knowledge to assist prescribers and help educate patients about medicines use.

Different criteria have been suggested by the Ministry of Health in Sudan in the plan to improve hospital pharmacy practice (Directorate of Pharmacy, 2006). These included improvement of the overall hospital pharmacies environment and service, provision of cost effective medication, rational use of drugs, continuous training for pharmacy staff and provision of the clinical pharmacy service by establishing the clinical

pharmacy concept and training pharmacists to become clinical pharmacists. Clinical pharmacists as described in the plan are these pharmacists who can provide patient focused pharmaceutical service and work closely with other members of the healthcare team to ensure safe and effective drug therapy.

At the time of publishing the above report by the Ministry of Health, there was not any established clinical pharmacy practice in any of Sudan hospitals (Directorate of Pharmacy, 2006). However, in Khartoum there were five hospitals which were reported as to be in the process of adopting clinical pharmacy. At the same time there were sixteen pharmacists from government hospitals who were enrolled in the postgraduate course of clinical pharmacy provided by the school of pharmacy in the University of Khartoum. Accordingly, two different job classifications have been identified for hospital pharmacists in Khartoum hospitals during this study. These are clinical pharmacists, those with post graduate degree in clinical pharmacy, and non-clinical pharmacists. This study will focus on the role of hospital clinical pharmacists.

2.12.1 Studies in hospital pharmacy in Sudan

Few studies were found in the literature that examined the role of hospital pharmacists in Sudan. A study was conducted in 2004 about the role of hospital-based pharmacists in some of Khartoum teaching hospitals (Awad, 2007a). Awad et al (2007) aimed to investigate the perception, experience and expectation of hospital medical doctors towards the pharmacists' role. Out of 300 randomly selected doctors from four teaching hospitals in Khartoum, 200 (66.7%) responded to a self-administered questionnaire. The study reported that the doctors responded positively with regard to their expectations of the pharmacist's role. The medical doctors were found to be more accepting of certain duties of pharmacists such as detecting prescription errors and least receptive of other suggested roles such as pharmacists recommending

prescription medications for patients. Although one of the study aims was to examine doctors' experiences with hospital pharmacists it is not clear if that aim was achieved. The study found that half of the doctors had rare contact with pharmacists. In addition, it is not clear how the other half came in contact with the pharmacists considering that it is unlikely that the pharmacists were available in clinics or on the wards.

Furthermore, some of the doctors' experiences with pharmacists were reported to do with pharmacists' advice about cost effective medications. It is not clear if the doctors were considering medical companies' pharmacists or hospital-based pharmacists. Some of the survey questions can also be considered more to do with community pharmacists than hospital pharmacists, for example, statements about 'treating minor illnesses' and 'suggesting non-prescription medications'. Thus the study can be considered more as examining perceptions and expectations rather than actual experiences of doctors towards hospital pharmacists.

The above study findings suggested that doctors were willing to accept pharmacists' contributions in health care. However, their actual experience with pharmacists is difficult to tell. Currently, with clinical pharmacists appointed in some of the hospitals in Khartoum; first graduates in 2007, it is worth investigating if the doctors have had actual experiences with the clinical pharmacists and how their perceptions have varied.

Similar findings to Awad (2007a) were identified in studies conducted about doctors' perceptions and expectations of hospital pharmacists in different countries (Fahmy et al., 2013, Khmour et al., 2013, Matowe et al., 2006, Zaidan et al., 2011, Tahaine et al., 2009). Physicians were usually positive about pharmacists' involvement with the physician in hospitals. The roles which were usually expected from pharmacists were the traditional roles of solving drug related dilemmas. The involvement in advanced clinical roles was not yet expected from the pharmacist. However, as most of the physicians were not exposed to pharmacists in these studies, the increase in contact between the physicians and the

pharmacists may change the physicians' expectations (Nelson et al., 1978b, Ritchey and Raney, 1981).

In a similar attempt to investigate the effect of hospital pharmacists in Sudan, a study was conducted in Alshaab hospital between 2003-2004 (Abdelhamid et al., 2008). The study aim was to investigate the effect on asthma patients when they have their medicines reviewed by a hospital pharmacist. A group of sixty asthma patients had their medication reviewed and counselling provided by a trained pharmacist. Patients were followed up every two weeks and for six months on follow up appointments. The study found that there was an overall reduction in asthma symptoms in the patients who received counselling in comparison to a non-intervention group who did not receive such a counselling service and received their medication as normal from the dispensary. In spite of the limitations of the study, which include patients dropping out or not appearing on follow up weeks and depending on self-accounts in part of the assessment, the study identified one of the roles that can be played by hospital pharmacists in Sudan.

2.12.2 Pharmacy education in Sudan

In the early 1990s there was only one school of pharmacy in Sudan graduating between 40 and 50 students each year. This is the school of pharmacy in the University of Khartoum (U of K), the oldest university in Sudan which was previously known as Gordon Memorial College. Only students who get 90% or over in their high school certificate exams will be accepted into pharmacy in U of K (Mohamed, 2011). However, in the last fifteen years more than ten new schools of pharmacy, public and private, have opened in Sudan. It is the perception of the researcher that this may not only be due to the government policy to increase the number of graduates in Sudan, but also due to an increase in interest in pharmacy qualification by many of those students starting their college education. Part of the reason for this is that opportunities for jobs and higher salaries

have been perceived to be better for pharmacy graduates than for those graduates from other health related disciplines.

As perceived by the researcher, many of the newly opened schools of pharmacies in Sudan have been trying to attract students by advertising a clinically oriented curriculum. However, it is difficult to tell to what extent this clinical curriculum was fulfilled. The oldest schools of pharmacy seem to be the ones that are behind in making a move from the classical teaching of pharmacy to the new era of clinically based pharmacy teaching (Mohamed, 2011). Many reasons were attributed to this, including lack of resources, funding and lack of trained personnel who can provide such clinical teaching. Other factors also included resistance from some of the academics in moving forward with clinically-based pharmacy program which may endanger other classical disciplines in pharmacy, for example, pharmacognosy or physical pharmacy.

The first post graduate course in clinical pharmacy in Sudan was established by the Faculty of Pharmacy, University of Khartoum in 2004 (Mohamed, 2011). It has been a means for providing a step forward in pharmacy practice in the country by offering clinical training which the majority of the pharmacy graduates of Sudan are considered to lack. The course is a two year course and attracted many applicants each year but the course has only allowance for 20-30 applicants per year. The total number of clinical pharmacists graduating from this course reached 141 in 2011. Although there were pharmacists who did post graduate degrees in clinical pharmacy outside Sudan years before the start of this course at the University of Khartoum, and worked in hospitals, clinical pharmacy practice was officially recognized in the hospitals when the concept was recognized by the Ministry of Health and the course in Sudan had its first graduates available in the hospitals.

In 2012, the Sudanese Society for Clinical Pharmacists (SSCP) was established. One of the aims of the society is to provide continuous

professional training for clinical pharmacists. The SSCP has been organizing lectures about different clinical topics as well as inviting members to regular meetings to discuss issues of concern with regard to clinical pharmacy practice.

2.13 Summary of the literature review

In summary; clinical guidelines are considered as a useful tool in clinical practice. However, certain criteria concerning the development and implementation of these guidelines, as discussed earlier, need to be considered in order that they can serve the purpose of translating best scientific evidence into patient care. One of the challenges of guidelines is their application in healthcare settings with limited resources especially in developing countries. Cardiovascular disease is an example of a discipline with a large number of guidelines, and although it was once considered a disease of the developed world, its prevalence is on the rise in many developing countries including Sudan. Therapeutic treatment promoted by these clinical guidelines is said to reduce morbidities and mortalities in patients with heart disease and is endorsed by a number of international bodies including the World Health Organization. Related to therapeutic treatment, the role of clinical pharmacists in hospitals is gaining more attention worldwide as there is a strong belief in the positive effect these pharmacists can provide in assisting prescribing. Although the role has been established for a number of decades in US and UK, it is emerging as a new area of practice in countries like Sudan. Therefore, this study is going to examine prescribing in cardiology and the new role of clinical pharmacy in Sudan focusing on the use of guidelines by prescribers and the perceived influence of availability of guidelines on the practice of clinical pharmacists.

Chapter 3 Aim and Objectives

3.1 Aim

Based on the areas discussed in chapter 2, the aim of this study is to use a mixed method approach to examine the use of guidelines in prescribing in cardiology and to explore how availability of guidelines is perceived to influence the new practice of clinical pharmacy in Sudan.

3.2 Objectives

To achieve the above aim, the following objectives were identified:

1. To examine the factors considered by doctors when prescribing for patients in Khartoum cardiac hospitals, in particular the use of clinical guidelines in prescribing
2. To identify the possibility of using clinical guidelines whether national or international in clinical practice in Sudan
3. To explore the new clinical role of hospital pharmacists in Sudan
4. To identify the challenges facing clinical pharmacy practice in Sudan, in particular the influence of availability (or unavailability) of guidelines on the practice of clinical pharmacists in hospitals

3.3 Principal research questions

1. What are the factors influencing prescribing in heart disease in Khartoum cardiac units and are clinical guidelines one of these factors?
2. Can clinical guidelines and in particular international guidelines be applied in clinical practice in Sudan?
3. What are the major challenges facing the new practice of clinical pharmacy in Sudan?
4. Does the availability (or unavailability) of clinical guidelines influence the practice of clinical pharmacists in hospitals in Sudan?

CHAPTER 4 METHODOLOGY

4.1 Introduction

This chapter discusses the methodology behind this study design. The chapter provides an overview of the methods used in this study, the issues surrounding their use and the data analysis techniques. The chapter's main focus will be on the methods considered or employed in this research. The chapter also includes the materials used in this study.

4.2 Background to methodology

The methods that are to be used in social research are usually linked with the theoretical assumption behind how the problem of concern is to be studied (Bowling, 2009a, Bryman, 2012). Based on this assumption a distinction is made between two most common approaches in research, quantitative which is based on the theory of positivism and qualitative research which is based on interpretivism. The choice between using either approaches or using both of them that is a mixed method approach in a certain study depends on the research questions. In this study a mixed method approach was used to answer the research questions. The study involved the use of a number of qualitative and quantitative methods generally used in health research.

4.3 Mixed methods research

The main feature of mixed methods research is the combination of quantitative and qualitative data to answer the research questions (Tashakkori and Teddlie, 2010). Mixed methods research is said to be derived from Campbell and Fiske's work in psychological features in 1959 where multi methods were used for their study (Creswell, 2003, Creswell and Plano Clark, 2007). Different concepts of mixing data have later emerged and more people were inspired to mix methods in their research work. Although mixed methods research was also known as multi-method research, Creswell and Plano Clark (2007) have argued that multi-method

research is different from mixed methods research in that the former in contrast to the later, is based on multiple forms of either qualitative or quantitative methods. The following advantages of mixed method research as discussed by Creswell and Clark (2007), were the reason for choosing a mixed method approach in this study.

1- Each qualitative and quantitative method has got its strength and weakness points so by combining the two methods it may be possible to reduce the weakness of each method ((Bowling, 1997b, Creswell, 2003). However, others have opposed this argument on the basis that each method comes from an opposing epistemological approach (Bowling, 2009b, Bryman, 2012). The advantages and disadvantages of each method are going to be explained in section 4.4 and 4.5.

2- Results from one method can be used to construct or enlighten another method (Creswell and Plano Clark, 2007). For example, a qualitative method is used to explore a certain phenomenon within a small group followed by a quantitative method to test this phenomenon on a larger sample of the population.

3- The design of mixing both qualitative and quantitative data is said to provide a better comprehensive understanding of the research problems than either data used alone.

4- Mixed methods research can be used where the research problems cannot be explained by using either qualitative or qualitative methods separately.

As mixed methods research involves joint use of qualitative and quantitative methods, there are different approaches of combining the two methods. Creswell (2003) identified six main designs that can be considered for use in mixed methods research depending on the study objectives:

1- Sequential explanatory design: in this design initially quantitative data is collected and analysed followed by collection and analysis of qualitative data. In this type of strategy usually the quantitative data is given more priority.

2- Sequential exploratory design: Similar to sequential design, the main difference is that qualitative data are first collected. The researcher usually identifies relevant issues with regard to the research question which can then be studied quantitatively.

3- Concurrent Triangulation design: This is a commonly used strategy in research whereby different methods are used in a study to validate the findings obtained. The methods are used simultaneously in one phase in contrast to the previous sequential designs.

4- Concurrent Nested (Embedded) design: This is similar to the triangulation design in that it occurs in one phase but there is usually one approach to data collection which has more priority than the other method. The different types of approaches are mixed at the design stage, for example, design for experimental studies.

5- Sequential Transformative design: In this design the priority can go to either type of data, qualitative or quantitative, or both if required. Unlike the exploratory or explanatory methods, this design is influenced by prior theoretical assumption which has a bigger influence in directing the study

6- Concurrent Transformative method: This method can follow the triangulation or the embedded strategies but as a sequential transformative design the research is usually led by a certain theory.

Considering the above methods, this study followed a sequential exploratory design. As little was known about the phenomenon to be investigated, the qualitative data was collected first followed by the quantitative data which was used to enhance the qualitative data. Bryman (2012) identified that this enhancement of data is the most common reason for which mixed method research has been used. However, there are some challenges encountered with sequential mixed method research design as identified by Creswell and Clark (2007) in Table 4.1.

**Table 4.1 Advantages and challenges of sequential mixed method design
(Creswell and Clark (2007))**

ADVANTAGES	CHALLENGES
Separate phases allow ease of description of the report	Issues with ethical approval as the design of the next method may not be identified prior to the initial method
Emphasis on qualitative findings with quantitative results makes the study more approachable for certain readers	Length of time required to conduct each phase separately
The design can be equally applied on single phase or multiphase studies	Using the same or different participants, the latter is usually the case in exploratory studies

The above challenges were encountered in this study, for example, having to go through ethical committees more than once as changes were made to the study design. The time factor was also a challenge as each phase of data collection was conducted separately. In addition, different participants were used in different phases of this study to explore the phenomenon studied.

The different qualitative and quantitative methods used in this study are going to be introduced and discussed in the following sections. This will include the theory behind each methodology, how data were collected using these methods and the different methods of analysis. In this study the methods used were, semi-structured interviews, focus group discussion and surveys. In addition, an exploratory observation was used to gather preliminary data about the research field before starting data collection.

4.4 Qualitative methodology

Qualitative research is used to gain a better understanding of people's experiences and ways of thinking (Creswell, 2009, Smith et al., 2002). The idea behind using this type of research is that the phenomenon explored is better understood from the interpretation of the participants involved (Bryman, 2012). However, this is also the main criticism for this type of research in that it is too subjective in its accounts by depending mainly on people's views. Another challenge for qualitative research is the effect of the researcher on the research conducted (Malterud, 2001). The argument is that the researcher perceptions and opinions will have an effect on the whole study process. The solution suggested was that for the researcher to claim his/her background, preconceptions and to clearly distinguish what is claimed based on previous assumptions from that emerging from the data. This is also known as reflexivity. In this study the researcher background and experience were earlier identified as these may had influence on how the study was conducted. In addition any claim in this study based on the researcher's perceptions or previous experience was clearly stated.

In this study, the use of qualitative methods served the objectives of the study whereby the views and the experiences of the participants were required to understand the issues explored. In addition, it was possible to identify and introduce new areas for investigation that become apparent from the participants' views which is an advantage in qualitative research.

4.5 Quantitative methodology

Quantitative research generally uses numbers to study the problem in question (Bryman, 2012). The idea behind using quantitative research is that the problem investigated is understood objectively usually by collecting numerical data or undergoing a laboratory experiment. Results

obtained from this type of research are expected to be generalizable and can be applied in other settings. The main criticism for this type of research is that relying on numbers and instruments only in providing information, disconnect research from actual people. In many situations especially with relation to healthcare, numbers and scientific experiments are not the main important criteria in solving the patient problem (Malterud, 2001).

Qualitative and quantitative research are often better understood when they are compared to each other (Bryman, 2012). Some of these differences are shown in Table 4.2.

**Table 4.2 Comparison between qualitative and quantitative research
(Bryman, 2012)**

QUALITATIVE	QUANTITATIVE
Words	Numbers
Participants views	Experiment results
Semi structured/ Unstructured	Structured
Generalisation	Restricted
Natural settings	Artificial settings
Inductive	Deductive
Interpretivism	Positivism

4.6 Validity, Reliability and Rigour of research

There are important concepts which are often considered in research. These are validity, reliability and rigour.

Validity

A valid method of measurement is a one that is measuring what it is meant to measure (Bowling, 2009b). The issue of validity differs between qualitative and quantitative research. In quantitative research, for example in a survey, the questions need to be valid so that a reliable answer can be obtained, whereas in qualitative research where the data are obtained from people's views and experiences, the validity of the research will be to obtain a true reflection of people's perceptions (Smith, 2002a).

There are different ways in which the validity of an instrument can be assessed (Bowling, 2009b, Smith, 2002a). Some of these approaches which were applied in the questionnaires used in this study are briefly defined below:

Face validity: This is considered as an initial step in identifying any problem with a measure. For questionnaires this can be a check of questions which are difficult to understand.

Content validity: This is a measure of to what extent is the instrument examining or covering the areas that need to be researched.

Construct validity: This is to test if a group of questions are considered to be related to the concept that they are expected to measure.

Validity can also be divided into external and internal validity (Bowling, 2009b, Smith, 2002a, Malterud, 2001). The external validity, sometimes also referred to as transferability, is obtained if the research results can be applied beyond the research settings that is generalised. This usually involves quantitative data. Internal validity on the other hand occurs if the results obtained are truly the cause of the 'effect' applied that is whether

the study actually investigated what it is supposed to. With regard to this study which was exploratory in nature, the aim was not to generalize any results obtained but a degree of transferability of the results obtained can be expected to be applicable in similar settings to where the research was conducted.

Reliability

Reliability is a test of whether the same results are reproducible if the same process is repeated (Bowling, 2009a). Reliability has also to do with consistency of measure, that is, the set of measures are actually all 'tapping' into one criterion that they are measuring (See Cronbach's alpha section 4.9.3). Unlike quantitative data, the reproducibility of responses is not the aim of qualitative data. Reliability of analysis in qualitative research is achieved through detailed documentation of data from interviews, focus group discussions or observation (Mays and Pope, 1995).

Rigour

Rigour is a concept related to the validity and reliability of data (Bowling, 2009b, Smith, 2002a). The concept refers to essential factors in the research process which ensures high quality and confidence in the data obtained. The systematic and consistent approach to research design, the importance of how data are interpreted and the detailed explanation of the steps involved in the research are some of these features. To check the rigour of the research, several methods such as the use of an independent researcher to verify the findings or the use of triangulation in mixed methods can be applied. However, rigour considered to be more problematic in qualitative research than quantitative research. Whereas rigour in quantitative research can be verified based on the measures of validity and reliability of the methods used, the concept in qualitative research relates to several features of the study process including consistency, care for details and also honest approach during the whole research process.

4.6.1 Threats to reliability and validity

Beside the validity and the reliability issues linked with the methodological approach, there are a number of threats to the study that can happen through different stages of the research process, some of these threats which were either experienced or cannot be ruled out in this study are briefly defined below (Bowling, 2009b).

Non-response bias: This is the difference between those who responded and those who did not respond, for example, in a survey.

Social desirability bias: People providing what they perceive to be the 'best' response and not the 'true' response. This was minimized in this study by trying to present the questions in the interviews or surveys in a way so as not to imply that there is a right or wrong answer.

Response-set bias: This is the tendency of participants to respond in a certain way regardless of the question content. In this study this was minimized by changing the direction and wording of the questions without causing confusion to prevent the 'mind-set' response. In addition, different questions were used to examine the same criterion.

Interviewer bias: The interviewer can consciously or subconsciously affect the interviewee response. The interviewer's skills can play a role in minimizing this effect.

Observation bias (Hawthorne-effect): People respond differently when they are observed. This will be further discussed in section 4.8.1.

Sampling bias: This refers to the part of the population of interest who for different reasons were not sampled.

Reporting bias: Participants are biased in the information they provide, that is what to report and what not to.

Different measures were taken in this study to enhance the validity, and reliability of the methods used in this study and to limit the threats to validity and reliability that can occur. Some of these measures were described above. In addition, some of the threats that may have been

experienced or cannot be ruled are reported as part of the methodological limitations of each phase of the study (section 5.6, 6.6, 7.6 and 8.6). A summary of these measures and limitations is also provided in the final chapter of this study (section 9.3).

4.7 Sampling of participants

In most quantitative research, sampling is preferably carried out in a random manner with a large number of participants and sites selected so that the results can be generalised to a larger population (Bowling, 1997a, Creswell, 1998, Creswell, 2009). In qualitative studies the aim is not to generalise the results but to explore the issues investigated, hence, randomisation is not necessarily used. In this study purposive sampling was used which involve deliberate selection of participants with specific characteristics who can explain the phenomenon investigated (Bowling, 2009b, Smith, 2002a). Other methods of sampling that are generally used in qualitative research include representative sampling and convenience sampling.

4.8 Data collection methods

In the following sections the qualitative and quantitative methods used in this study are discussed.

4.8.1 Observation

There are different ways in which observation is used in healthcare research (Smith, 2002a). For example, it can be used qualitatively to explain phenomena, quantitatively to gather numerical data and also as an exploratory tool as part of a mixed method research. Exploratory observation is used to generate or identify some ideas which can then be researched more thoroughly. The value of observation comes from its ability to provide insights into the activities which are to be studied as they

occur. In an observation study, the observer can either be a participant or a non-participant observer, the later was the case in this study (Bryman, 2001, Smith, 2002a). Observation was used in this study as a preliminary exploratory step to gain an insight into the everyday practice within the participating hospitals. In many studies, non-participant observation is combined with other methods for data collection to provide additional information or to complement the data provided.

An important issue in observation studies arises when the participants are aware that they are being observed. This is known as overt observation study (Smith, 2002a). This may lead to the participants changing their normal behaviour as a result of being observed in what is referred to as the 'Hawthorne effect'. The extent of the 'Hawthorne effect' usually varies with the type of setting and people to be observed, the nature of the participants involved, the type of data collected and also how the observer is conducting his/her study. One of the methods which is suggested to reduce this effect is by spending much time as possible in the observation scene to reduce the reactive effects of the observer's presence. Considering the option of those being observed not to be informed about the presence of the observer, that is covert observation, can give rise to ethical dilemmas of not having the consent of those being observed to be involved in the study. In this study, the researcher intention to observe was stated as permission was asked in advance before any observation was carried out in the participating hospitals. The researcher spent different days of the week and different times of the day during a period of two months to conduct the observation (section 4.12).

4.8.2 Methods used in qualitative research

The qualitative methods used in this study for data collection were semi-structured interviews and focus group discussion.

4.8.2.1 Semi-structured interviews

Interviews are usually used to gain the views of people who have the knowledge in the areas to be investigated and are generally conducted face to face or through the telephone (Bowling, 2009b, Creswell, 2009, Smith, 2002a). The two main types of qualitative interviews are the unstructured and the semi-structures interviews. Both types of interviews are flexible in accommodating the interviewees' points of views, whereas the former is completely unstructured the latter will usually have some pre-set topics, usually in an interview guide, that the researcher will like to cover based on the research objectives.

Semi-structured interviews provide a more precise but flexible way of generating knowledge based on people's views and behaviour than unstructured interviews (Creswell and Plano Clark, 2007, Mason, 2002, Oppenheim, 2003, Smith, 2005). They also ensure coverage of predetermined research questions (Drever, 1995, Ritchie and Lewis, 2003). While in an interview, the researcher has the advantage of being able to explain the research questions and clarify any misunderstandings, compared to self-administered questionnaires, face to face interviews can be time consuming, costly to organize and also carry the risk of interviewer bias (Bowling, 2009a)(section 4.6.1).

Sampling in interviews

The methods used to sample participants for interviews usually follow the sampling criteria employed in qualitative research to select participants (section 4.7). For the interviews conducted in this study, purposive sampling was used to select the participants.

4.8.2.2 Focus group discussions

Focus group discussions (FGD) were said to have originated in market research but academics started to use them in research in the 1980s (Krueger and Casey, 2000). A focus group discussion is a form of a group interview which is used in qualitative research to allow the participants to express their views in a group discussion (Smith, 2002a). The members of the group are influenced by each other's comments and hence respond accordingly (Krueger, 1994). The advantage that focus groups provide for the research over the individual interviews, is the interaction that takes place between the participants in the group which could enrich the discussion. On the other hand, due to the nature of focus groups, individual views will be less easy to identify. However, the purpose of conducting a focus group is to provide the stimulation and motivation generated by the group discussion so that a wider range of ideas can be generated. The limitations of this technique which were experienced in this study were (Bryman, 2012):

- The difficulty of managing the group discussion especially for the inexperienced researcher ,
- The dominant participant,
- The quiet participant,
- The huge amount of data generated from transcribing the group discussion

Focus groups are run by a moderator also known as 'the facilitator' who is responsible for directing and at the same time partially controlling the discussion (Krueger, 1994). The moderator can have an assistant, a co-facilitator who assists in handling unexpected events such as interruptions, problems with tape recording during the discussion and also to note the level of participants' interactions. The moderator involvement in the discussion can either be minimal, moderate or maximum where he/she has total control of the discussion proceedings (Bryman, 2012, Krueger, 1994). The moderator, who was the researcher in this study, had some

involvement in the discussion during the FGD as will be described in chapter 7.

Sampling in FGD

In FGD, there should be a great consideration when selecting the participants with regard to their personal characteristics and experiences (Smith, 2002a). Groups of similar characteristics are assumed to be easier to engage with each other and hence, the desired level of interaction can be achieved (Krueger, 1994, Smith, 2002a). A small variation within the group can also be of value in providing contrasting views (Krueger, 1994). The number of members in each group is preferred to be between five and seven. Small group discussions are easier to run and provide a better chance to explore ideas but on the other hand may provide a smaller number of ideas than those generated from bigger groups.

4.8.3 Methods used in quantitative research

Two surveys were conducted which formed the quantitative part of this study.

4.8.3.1 Surveys

Surveys are considered to be one of the most widely used methods in research in general and specially in pharmacy practice research (Smith, 2002a). A survey is a process whereby information is obtained from a larger population of participants compared to other methods, for example, interviews. Using a survey to collect data is considered to be a less costly and easier method than other methods of research and hence, a bigger population can be included (Smith, 2002a). Some of the advantages and disadvantages of the self-administered questionnaire are shown in Table 4.3 (Bowling, 2009b, Bryman, 2012).

The most frequently used tool for conducting a survey is the questionnaire (Smith, 2002a). A questionnaire is made up of a set of questions usually closed questions but can have some open questions as well. Most of the survey studies are descriptive cross-sectional studies. This means that the information about characteristics of the population and their views about particular topics are obtained by single administration of the questionnaire which was the case in this study.

Unlike interviews and focus group discussions, participants are not usually asked to sign a consent form before participating in a survey. Answering and returning the survey is considered to be like an informal consent to participate (Sue and Ritter, 2012).

**Table 4.3 Advantage and disadvantages of the self-administered questionnaire
(Bryman, 2012, Bowling 2009)**

ADVANTAGES	DISADVANTAGES
Ease of administration	Risk of missing data
Large samples can be used	Pre-set responses
Less cost	Respondent cannot be asked for further verification of the answer
No interviewer effect on the participants	Cannot be used with certain types of participants (language/literacy)
No variability in questions (compared to Interviews)	No chance of explaining unclear questions to the respondents
Convenience of responding (none or few open questions)	Respondents may read the questionnaire as a whole before responding and that may affect the results
Less time consuming (compared to qualitative measures)	Response rate especially with postal questionnaire
Provide clear answers	Social- desirability bias

Sampling in surveys

With questionnaires, a random sampling method is generally applied which may allow generalization of the result. Examples of sampling techniques which may involve a randomisation technique are, cluster sampling and stratified sampling (Bowling, 2009b, Sue and Ritter, 2012). Other types of sampling techniques can be used when the aim of the research is not to generalise the results (section 4.7).

Construction of the questionnaire

There are several steps which are required to be considered during the process of constructing a questionnaire as explained below (Bowling, 2009b, Sue and Ritter, 2012):

Planning research

The first step in planning the construction of a questionnaire is identifying the topics of interest. In this study, the topics of interest were defined based on the research objectives, literature search and preceding interviews or focus groups.

Questionnaire design

In questionnaire design, scales representing different measures have been used to identify respondents' views (Bowling, 2009b, Bryman, 2012, Smith, 2002a). The respondents are asked to choose their response from a range within the scale which is usually a five-item range scale. One of the most commonly used scales in research is the Likert scale which was used in the two questionnaires administered in this study. The scale is said to be measuring respondents' attitudes when they are presented with certain statements on a questionnaire by identifying whether they agree or disagree to the statement presented. Attitudes were described by Oppenheim (2003) as 'a state mind readiness whereby there is a tendency to respond in a certain manner when confronted with a certain stimuli'. A link is argued to exist between the values that people carry, their attitudes and their opinion (Oppenheim, 2003, Smith, 2002a).

A Likert scale is considered to be easy to prepare and easy to use by the respondents (Foddy, 1993). A number of criteria are to be considered when constructing a Likert scale including; statements should be related to the concepts studied and to each other, the concept studied should be in the form of statements and not questions and it is advisable to have a combination between positive and negative statements to avoid what is known as the 'response-set' participants (Bryman, 2012, Foddy, 1993).

Piloting

Before starting the survey, the questionnaire has to be tested on a small scale of respondents. This provides a means to discover any issues related to the content and construct of the questionnaire and can also be a preliminary test to detect the response rate.

Enhancing good response

A number of factors are involved in survey design that can help in increasing the response rate (Smith, 2002a). Some of the methods used to attract participants to a survey which were applied in this study were the use of coloured papers for the self-administered questionnaire, writing invitation letters which included information about confidentiality and sending reminders to the participants within a short period of time, a week is usually considered reasonable (Sue and Ritter, 2012).

Administering questionnaires

Several methods can be used to administer a questionnaire, these include self-administered mail questionnaires, telephone interviews, hand-delivered self-administered questionnaires and in recent years online surveys. In the first survey in this study, questionnaires were self-administered to the participants where as in the second survey, an online questionnaire was used. The use of online surveys will be more discussed in the following section.

Online surveys

Researchers have identified two types of on-line surveys, e-mail surveys and web-based surveys (Sue and Ritter, 2012). In e-mail surveys participants access the questionnaire by 'clicking' a link sent to them via their e-mail addresses which was the case in this study. In a web-based survey, the participants access a specific website where they are asked to complete a questionnaire. Some of the advantages and disadvantages of online surveys are shown in Table 4.4 (Sue and Ritter, 2012).

**Table 4.4 Advantages and disadvantages of online questionnaires
(Ritter, 2012)**

ADVANTAGES	DISADVANTAGES
Relatively low cost	Bias to internet users
Wide geographic area	Technical problems
Speed	Blocking emails

Similar methods for sampling that are used in other types of surveys can be applied for online surveys. With online surveys the chance of coverage limitation due to internet use can be a cause of non-response error. The users of the internet can vary according to factors such as age, education level and whether they are living in urban or rural communities (Sue and Ritter, 2012). Although the targeted population in this study for the online survey were expected to be internet users based on education, the issues of internet coverage and the use of personal emails were also expected to be a limitation.

4.9 Data analysis

The following section describes some of the approaches that can be used to analyse qualitative and quantitative data focusing on the approaches considered for this study.

4.9.1 Analysis of mixed method research

In a mixed method study, data can be analysed separately (Creswell and Plano Clark, 2011). However, to verify the use of the mixed method approach, it should be explained in the study how the qualitative and quantitative approaches helped each other in answering the research questions. The quantitative and qualitative part of the mixed-method research need to be linked or connected at an earlier stage or a later stage in the research (Creswell and Plano Clark, 2011, Creswell, 2007). According to Creswell and Plano Clark (2011), one of the important criteria in evaluating mixed method research is the ability to combine the quantitative and qualitative data when discussing the results. In this study the data from the different methods used will be discussed separately first, and then in combination with the subsequent data collected.

4.9.2 Analysing qualitative data

There are several approaches that can be used to analyse and interpret qualitative data. These approaches usually employ either a deductive or an inductive process of analysis. While a deductive approach to research draws on pre-set assumptions or understanding of the phenomenon to be investigated, an inductive approach develops hypothesis purely from the data obtained (Dew, 2007). However, there are certain common features in analysing qualitative data. Qualitative analysis usually begins with 'coding' of the data (Bowling, 1997a). This means relating sections of the text for example from interviews or focus groups, to a single word or groups of words, either derived from the text or generated from the meaning of the text. Codes with similar inferences can then be joined

together to a category or a theme to which they are related. These themes can either be derived from the research questions or identified from the data. Computer packages such as N-vivo helps with this process, bearing in mind that one interview may generate about ten pages of transcription and a focus group discussion can sometimes generate more than double that number as experienced in this study. For the purpose of this research the following two approaches in analysis of qualitative research were considered.

Thematic analysis

Thematic analysis is considered as the most common form of analysis used in analysing qualitative data (Pope and Mays, 2006, Bryman, 2012). In its simplest form, the relevant part of the data, for example from an interview or a focus group discussion, is coded and then these codes are grouped into themes, either anticipated in advance or emerging from the data. These themes can then either be described as such or relationships between the themes and how they are connected can be identified. Thematic analysis can be used in exploratory studies or mixed-methods studies.

Frame work analysis

This is a more deductive process of data management compared to thematic analysis (Bryman, 2012). The idea is that the research has pre-set information requirements that need to be explored by the research and the results are expected to have the potential that lead to undertake a certain action (Bryman and Burgess, 1994). It shares the same features of inductive approaches of analysis in that data are collected from people's words. However, it is deductive in that data collection is driven by the set of objectives. The process was developed by the National Centre for Social Research in the United Kingdom with the idea of conducting applied qualitative research (Bryman and Burgess, 1994, Pope and Mays, 2006). Data analysis in the framework approach is similar to thematic analysis involving coding and identification of themes, however, as discussed earlier, it is more directed by previous set requirements. The main stages

of framework analysis as explained by Pope and Mays (2006) can be explained in the following order:

- 1- Familiarization with the data collected.
- 2- Identifying key themes using the previous set aims and objectives in addition to related issues raised or emerged during data collection
- 3- Indexing which is applying the themes to the data, that is each part of the text is attached to a relevant theme or a number of themes.
- 4- The data is then charted according to the different themes. Different headings and subheadings can be used derived from the research objectives or from the data analysed (Bryman and Burgess, 1994).
- 5- The data is interpreted based on the previous set objectives. Association between themes and explanation is provided at this stage.

In this study two qualitative methods were used which were interviews and focus group discussion. Framework analysis was used to analyse the interviews conducted with prescribers as the study had pre-set objectives that needed to be explored and the findings are expected to be applied into practice. While methods of analysis used in qualitative research can be employed in focus group discussions, due to the interacting nature of FGDs the analysis is usually a more complex process than individual interviews (Smith, 2002a). According to Krueger (1994), FGDs can be analysed in either of three approaches; raw description of data, summary of data or summary and interpretation of data. In this final approach the data is analysed in a descriptive manner with minimal interpretation while more interpretation of the data is provided in the discussion section. To provide more interpretation of the data generated, the final approach was employed in analysing the FGD in this study.

4.9.3 Analysing quantitative data

To justify the statistics that was chosen to analyse the surveys' results of this study, a small introduction into the theory of statistics is described

below which explains the reasons behind the statistical methods used in this study.

Statistical analysis

The type of the statistical techniques to be used for analysis of any study will depend on the objectives of the study (Smith, 2002a). Surveys are usually considered as descriptive in nature, and therefore, descriptive statistics are usually used to describe most of the results obtained. In order to choose a certain statistical approach in analysis, the type of data attached to the variables, for example, the answer category of questions in a questionnaire, need to be identified (De Vaus, 2002b, Smith, 2002a, De Vaus, 2002a). There are three types of data or 'level of measurement' that can be obtained; these are interval (continuous), nominal or ordinal data. Data from a Likert scale are considered as ranking data and hence treated as ordinal. However, it is worth mentioning that some researchers argue that the intervals between the items in a Likert scale can be considered as equal and hence, it can be treated as interval data (Bowling, 2009b, Bryman, 2012). In this study the data obtained from Likert scale was treated as ordinal data.

Parametric and non-parametric statistical methods

Statistical methods of analysis can be classified into parametric and non-parametric. Parametric statistical methods are based on the assumption that the data obtained from a certain test 'conform to a normal distribution' in the desired population (Smith, 2002b, Bowling, 2009a). This assumption is more likely to be expected with continuous data than ordinal data, and thus parametric statistical tests are usually suitable to use with this data, for example, t-test and analysis of variance. Non-parametric tests are considered as 'free' from the normal distribution assumption (Field, 2009). For ordinal and categorical data non-parametric procedures are usually suitable, for example, Mann-Whitney U test and Kruskal-Wallis

analysis (De Vaus, 2002a, Field, 2009). Therefore, for this study the data obtained from Likert-scale were considered to be fit for non-parametric statistics.

Data can also be explained in terms of degree of significance (Smith, 2002a). A 'p' value is the calculated probability usually used to denote the possibility of the result occurring by chance. A p value of less than 0.05 (that is 1 in 20) is generally considered as predicting statistical significance of the test. Lower levels (< 0.01) were also used by researchers for example, when there is a necessity for more strict results. Alternatively in a small sample, there may be a need to adjust the 'p' value to more than 0.05 to avoid missing significant results that may result in an error. This is going to be explained in the following section.

Type 1 and Type 2 error

The aim of taking the statistical test is to confirm an assumption (Pallant, 2005). The statistical analysis is used to test whether a certain intervention rejects or accepts the 'null hypotheses'. That is either there is or there is no difference when an intervention is applied. This can lead to two types of errors in the results. Type 1 error occurs when the hypothesis is rejected and a difference is reported, that is an intervention is claimed to make a difference, when there is not actually a difference. Type 2 error occurs when the hypothesis is accepted but there is actually a difference between the groups which was not identified. These types of errors are very much affected by the sample size of the study and may require adjustment of the 'p' value set for the test. An example of an adjustment method is what is known as the 'Bonferroni test' which is used to adjust the p-value to minimize the chance of reporting a statistical significance which is not there, that is Type 1 error. Because these two errors are oppositely related, it is considered that any effort to minimize one type of error will increase the risk of committing the other error (Pallant, 2005).

Association between variables

In survey studies, the relationship between variables is usually studied to try to propose a link between certain characteristics and the responses provided (Smith, 2002a). Depending on the variables' level of measurement, that is, whether nominal, ordinal or interval, a specific correlation test is used to measure associations between the variables, for example, Kendall's tau is used to measure associations between ordinal variables (De Vaus, 2002a, De Vaus, 2002b).

Cronbach's alpha (α)

Cronbach's alpha (α) can be used to detect if a set of variables, for example, statements in a Likert scale, used to study one particular criterion are correlated together and are actually measuring that one criterion (Smith, 2002a). It is one of the commonly used statistical tests for internal reliability or consistency of items in a scale (Bryman, 2012, De Vaus, 2002a). The value of alpha is said to depend on the type of scale and its purpose (Pallant, 2005). A value of 0.7-0.9 is considered to be a positive indicator of consistency. However, some researchers have used lower figures to indicate acceptable levels of consistency (Bryman, 2012). A different point of view with regard to Cronbach's alpha is that a lower value of (α) can also be positively considered as it shows that different issues were tested in a scale (Taylor, 2014). Alpha (α) was used in this study to measure the consistency between the set of statements used in Likert-scale.

4.10 Materials

The following part of the review describes the participants chosen for this study. The selection of participants in this study was carried out using purposive sampling. That is those individuals who were considered to have the knowledge about the issues to be examined were selected to take part in the study.

4.10.1 Description of the participating hospitals

Hospitals were selected in this study to represent the main cardiac hospitals, or units in Sudan. Government hospitals in Sudan were divided into federal and state hospitals. Federal hospitals were based in Khartoum and patients from different parts of Sudan could be referred to them. These hospitals were under the management of the Federal Ministry of Health. State hospitals were managed by the State Ministry of Health. However, soon after starting this study, this classification has changed and federal hospitals in Khartoum are now under the management of Khartoum State Ministry of Health. In government hospitals patients do not pay for the hospital bed but they do pay for most of the other services including medication. However, the costs are considered to be much lower compared to private hospitals. Information about the hospitals were provided by verbal communication with hospital managers, pharmacists and doctors working in the hospital, human resources department and from some pamphlets about the hospitals. A visit was made to the hospitals prior the start of the study to get some background information about the hospitals.

Alshaab Hospital

Alshaab hospital is the main government (federal) hospital in Sudan specialised in cardiology, located in the centre of Khartoum. The hospital was opened in 1959 but the establishment of the cardiac section took place in 1962. At the time of data collection, the hospital had three main specialities, cardiology, respiratory and neurology but changes have taken place in the hospital since the start of this study. There were two medical cardiology wards in the hospital for male and female patients with a total of 48 beds, a coronary care unit (CCU) with six beds and two intermediate care units attached to the CCU accommodating 12 beds. There was a minor CCU, three-bed unit, attached to accident and emergency (A&E) department where patients were kept till a bed becomes available in the main CCU.

Ahmed-Gasim Hospital

This is a state hospital located north of Khartoum. The hospital was officially opened in 1993. It has three specialities:-, paediatric, renal and cardiology. It is very well known for its open-heart surgery centre which was established in 1998. The hospital does not have an accident and emergency unit but accepts patients referred from other hospitals and clinics if there is a need for cardiac care and especially cardiac procedures. There were two wards for cardiology patients in the hospital during the time of data collection, but more wards were added to the hospital since that time. Currently the hospital has three cardiology wards with a total of 30 beds and two CCU with a total of 20 beds.

4.10.2 Participating healthcare professionals

The participants in this study were the prescribers and the clinical pharmacists in the two main cardiology hospitals in addition to another group of clinical pharmacists in Sudan.

Participating doctors

In the two hospitals, the number of doctors varies with time according to the rotational program of the training doctors. During preliminary visits to the hospitals, an estimation was made to the number of prescribers available. In Alshaab hospital, there were around 60 doctors, seniors (consultants) and juniors (registrars and medical officers) who looked after the cardiology patients. There were 17 consultants in the hospital with varying number of doctors in their units. In Ahmed-Gasim hospital, there were five cardiology teams identified in the hospital and six consultants. In each team there were about four to five junior doctors. An attempt to verify the exact number of doctors was carried out before the start of data collection.

Participating pharmacists

There were three clinical pharmacists working in Alshaab hospital, one for each medical speciality. In Ahmed-Gasim hospital, there were two

clinical pharmacists, one for the cardiology unit and the other one for the renal unit. The cardiology pharmacist was known to the researcher from previous visits to Sudan to be one of the first clinical pharmacists in hospitals in Khartoum.

4.11 Ethical considerations

A protocol was written for the research project. Ethical approval was sought from the National Health Research Ethics Committee of the Federal Ministry of Health in Sudan (Appendix 1). At the beginning of the research three cardiology hospitals were selected to be included in the study. These were two government hospitals and one partly-private military hospital. The committee requested that individual approval from the hospitals should be sought before data collection. The individual approval was given by the managers of two hospitals, Alshaab hospital and Khartoum–North-Ahmed Gasim Hospital.

4.12 Translation in multi-language research

The first language in Sudan is the Arabic language; however, the participants in this study who were pharmacists and doctors in Sudan were expected to have a good understanding of the English language considering that the majority of universities in Sudan have their pharmacy and medicine undergraduate courses in the English language. It was also the expectation of the researcher that the participants would be more familiar with many of the terms used in the study in the English language than the Arabic language as the former is the science language in Sudan.

With regard to the qualitative part of this study, the participants were allowed to choose the language of their choice that is either the Arabic or the English language, so that it would be easier to conduct the discussion using the language the participants most comfortable with (Eposito, 2001).

For the quantitative part which was the survey, the questionnaires were in the English language but were piloted first to ensure the suitability of the language used.

In multi-lingual research, there are two approaches for translation, either an interpreter is used to assist in translation of the research to the language of publication or the researchers are familiar with the language of the participants and do the translation by themselves (Choi et al, 2012). The latter was the approach taken in this study. It is important that the context is considered during translation to provide meaningful data that are understandable to different population (Al-Amer et al., 2014, Im et al., 2015). Eposito (2001) explained that the translator in research acts as the interpreter of data in that he/she considers the actual words as well as the context in which they were said, the culture behind them and the individual's experiences before providing transcription of data. In qualitative research specifically, the meaning-based rather than the word – based interpretation of the language is crucial to ensure the validity of the findings (Eposito, 2001, Choi et al, 2012). In this study, when required, meaning-based translation of the data was provided.

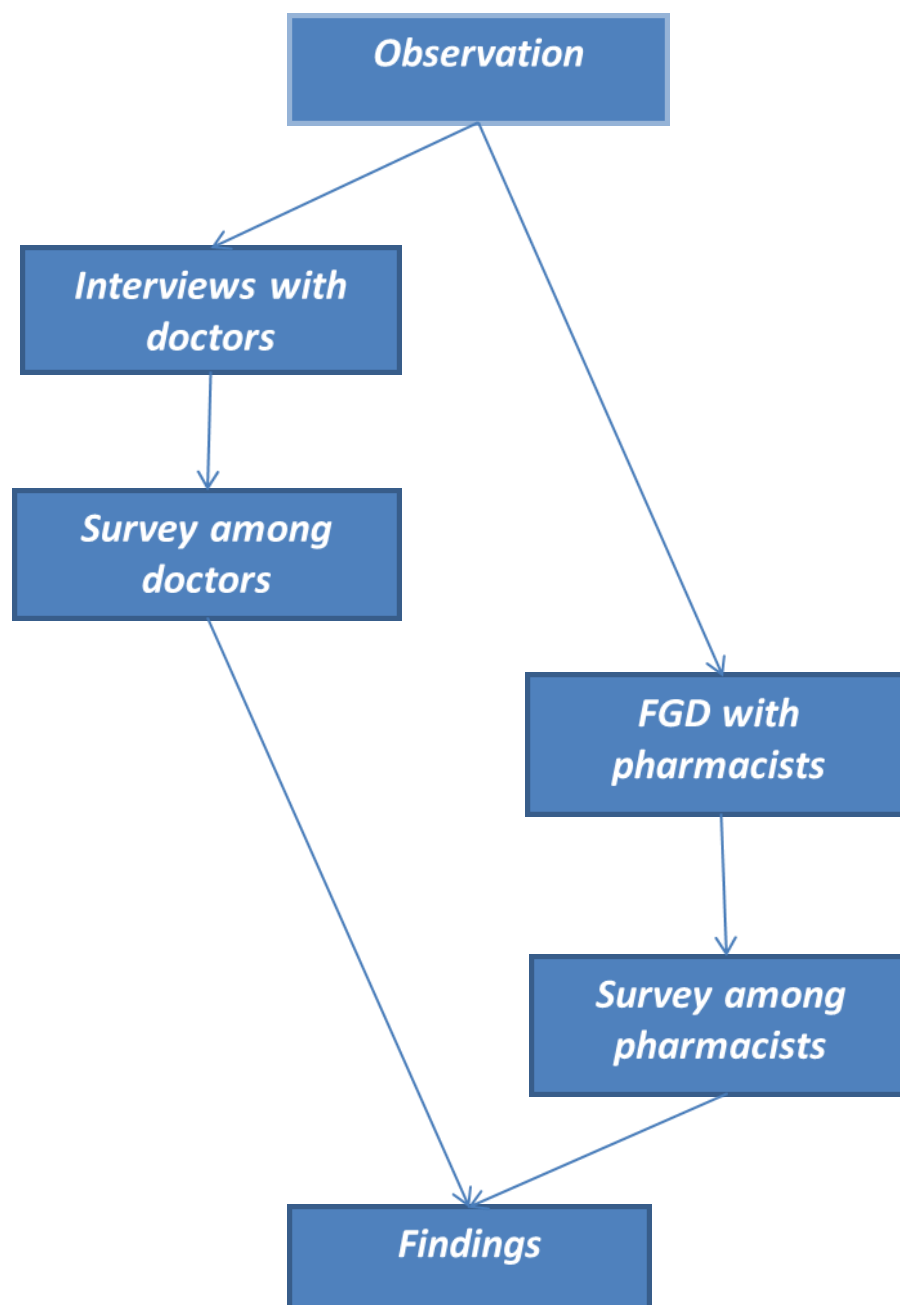
Although some have argued that if the researcher is the translator this may influence the results by producing biased transcripts, a greater danger is considered to occur if the translator cannot understand the culture, language and background of the participants (Choi et al, 2012). Not only does the translator need to be familiar with the language but also in the dialect used by the participants, For example, the Arabic language is spoken by many countries around the world but dialect differences exist between these countries in what is known as 'colloquial Arabic' (Eposito, 2001, Al-Amer et al 2016). Understanding the dialect used in Sudan has been considered as an important factor in the translation of the participants views and hence enhance the overall credibility of the research. In this study the researcher, being from Sudan was the translator of any text in the Arabic language to the English language which

is the language of this study. In addition the researcher used a Sudanese pharmacist to do a random validation of some of the translated data.

4.13 Study Design

The research design may be classified as a sequential exploratory mixed method design but can also be classified as a multi-mixed method research (Creswell and Plano Clark, 2007, Tashakkori and Teddlie, 2010). Different data collection tools were used at different stages during this study (Fig 3). In addition, different participants were used in different stages of the research which is expected in sequential exploratory studies (section 4.3). The data for the study was collected over three years between the years 2011-2014. After the literature review, the data collection tools were designed using qualitative and quantitative methods as is the case with mixed methods research.

The qualitative instruments which were the interviews and the FGD were used to get the participants views and perceptions in their own words about the areas investigated. The participants were also given the chance to identify any related issues to the study that they would like to discuss. The discussion in the interviews and the FGD led to emerging ideas from the participants that were not considered before and enriched the study discussion. The data from the qualitative methods were used to develop the quantitative tools.

Fig 4 Study Design

The quantitative tool used in the research which was the questionnaire, allowed the exploration of the views of the prescribers and other issues

related to the research objectives within a larger and a more diverse population of participants. This can increase the chance of the results obtained being transferred to similar areas of practice. The data were then integrated together when the results of the different methods were discussed. Integrating the findings from the different methods was meant to better explore the research questions.

The different methods of research conducted in this study according to the study design are shown below. The exploratory observation phase of the study is going to be presented in this section while the following phases of the research will be explained separately in the coming chapters of this thesis.

1- Observation

Observation was used as an exploratory method to inform the subsequent research instruments. It also examined the feasibility of the suggested study design.

Different methods of observation were used in the two hospitals to try to capture the widest picture of patient management. Time was spent in the hospitals between May and August of 2011 and different days and times were used for observation. A number of ward rounds were attended in the two hospitals to observe how treatment plans were discussed and initiated. This was more difficult to follow in Alshaab hospital than Ahmed-Gasim hospital as the former is a larger teaching hospital with a larger number of health care professionals and students attending the ward rounds. The researcher was not to participate in the ward activity and was shadowing prescribers or the clinical pharmacist as was the case in Ahmed-Gasim hospital. In addition to the ethical approval from the Ministry of Health, individual approval to conduct the observation was obtained from the hospital manager, the nurse in charge on the wards and the team leader of any ward round. The pattern of prescribing of cardiovascular medication was noted from clinical notes available on the wards.

There was also time spent in accident and emergency admissions and outpatient clinics. This provided a good opportunity to identify several issues faced by the patients and the doctors with regard to treatment. For example, the doctors had to depend on the patient to bring all his/her medicines or to have a prescription with all the medicines written as there was no hospital or primary care records to identify this information. In addition, issues related to patients' follow up, patients experiencing side effects or patient not taking their medicines because of cost or availability issues were also observed. Field notes were collected during the observation which assisted in conducting a guide for the design of the subsequent data collection methods.

2- Interviews with senior prescribers in Khartoum cardiology hospitals

The second phase of the research was to conduct interviews with prescribers working in the selected hospitals to explore the use of guidelines in clinical practice and the perceived role, if any, of the clinical pharmacists in the hospitals. Consultants and cardiologists working in the two hospitals were approached for semi-structured interviews (Chapter 5).

3- Survey among prescribers in the two cardiology hospitals

To get a wider range of views with regard to the issues investigated in this study, a survey was conducted with the prescribers working in the two hospitals (chapter 6).

4- Focus group discussion with clinical pharmacists in the two cardiology hospitals

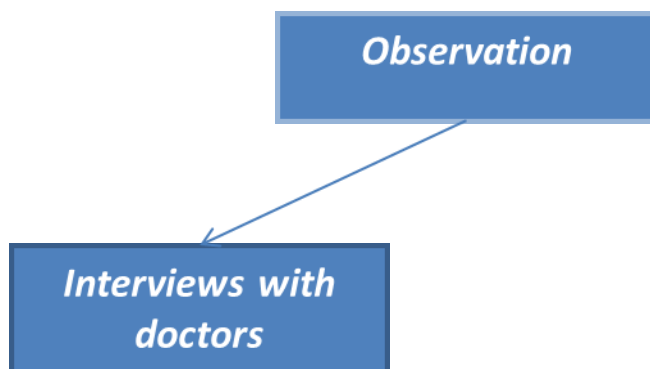
To identify the role of the hospital pharmacists in Alshaab hospital and Ahmed-Gasim hospital, a focus group discussion was carried out with the clinical pharmacists in the two hospitals (chapter 7).

5- Online survey among the clinical pharmacists of Sudan

Considering that there were only few pharmacists with a clinical pharmacy qualification in the two hospitals, the decision was made to conduct a survey among clinical pharmacists in Sudan (chapter 8).

A discussion of the results of each phase will be presented separately at the end of each chapter. As the different stages of research were connected with each other, some of the results will be more discussed in the subsequent chapters that follow after more data were collected. Furthermore, a final discussion of the results obtained will be presented at the end of this study to provide a comprehensive synthesis of the whole study (chapter 9).

CHAPTER 5 INTERVIEWS WITH SENIOR PRESCRIBERS



5.1 Introduction

This chapter discusses the second phase of this study after the preliminary observation, and the first stage of data collection which is the interviews that were conducted with the senior prescribers in cardiology in the main two cardiology hospitals in Khartoum. The objectives of the interviews were to identify the prescribers' views with regard to the factors affecting their prescribing particularly, the use of guidelines in prescribing and the role of clinical pharmacists in their hospitals. The chapter includes the method involved, the results obtained, discussion of these results and the methodological limitations.

5.2 Method

Semi-structured interviews were conducted with the senior prescribers in Alshaab and Ahmed-Gasim hospitals.

5.2.1 Sampling of participants

Senior prescribers working in the selected hospitals in Khartoum were the targeted population for individual semi-structured interviews. These senior prescribers were either cardiologists or consultants in their training to become cardiologists. These prescribers were believed to be the ones with the most influence on how prescribing is carried out in these hospitals and hence, they were purposively selected. The themes generated from these semi-structured interviews informed the design of the second research instrument, the survey with the prescribers, which will be discussed in chapter 6.

Arranging interview dates required several attempts due to the consultants' heavy work commitments inside and outside the hospitals. All

interviews were conducted in the hospitals where the doctors were working and in their place of choice which was either offices or treatment rooms. An information sheet describing the purpose of the study and the request for the interview was handed to each prescriber (or a secretary) before-hand when the prescriber was approached to conduct an interview (Appendix 3).

Eleven consultants out of possible 17 in Alshaab hospital initially agreed to participate in this study. The list of consultants was provided by the human resources department in the hospital. The rest six consultants were either not available at any time an attempt was made to approach them or apologized for not being able to commit to any interview date. Of the eleven consultants recruited, seven were senior consultants, three were junior consultants which mean that they were qualified as consultants but on rotational training to become cardiologists, and one was not a cardiology consultant but a physician working in cardiology for the last ten years. Of the 11 consultants who initially agreed to participate, two did not manage to make it on the interview date. A different date was again set but with no success.

In Ahmed-Gasim hospital, four senior prescribers out of possible eight, initially agreed to participate in the interviews. It was easier to identify the names of the consultants from the working staff because it was a smaller cardiac unit than AlShaab hospital. For the rest four of the prescribers it was either not possible to get hold of them or they apologized for not being able to take part in this research. Of the four consultants who initially agreed to participate, one did not manage to make it for any of the interview dates set.

5.2.2 Developing the interview guide

An interview topic guide was developed based on the objectives of this part of the study as discussed earlier, the reviewed literature about the use

of guidelines and from the observation conducted at the start of the research (Appendix 2). The observation has provided the opportunity to get an overview of how drugs are prescribed and how treatment plans are discussed between doctors and between the doctors and the patients on the wards and in clinics (section 4.12).

5.2.3 Conducting the interviews

A trial interview was conducted at an earlier stage with a neurology consultant for training purposes. At the beginning of each interview the prescribers were ensured confidentiality and anonymity of the information provided as explained in the information sheet handed earlier. The prescribers signed consent forms before starting the interviews (Appendix 4). The prescribers were asked permission for audio taping. The prescribers were the ones to decide whether to run the interviews in English or Arabic language, or a combination of both. As these were semi-structured interviews the interview topic guide was followed but there was always room during the interviews to discuss emerging issues of interest and relevant topics brought up by the prescribers (Bowling, 2009b, Smith, 2002a).

5.3 Handling and analysis of data

Interviews were transcribed verbatim and those which were conducted in Arabic were translated by the researcher into the English language. A pharmacist from Sudan was asked to choose one interview and then validate the transcribing and the translation of the interview chosen. The software N-vivo version 9 was used to aid analysis of the interviews. A frame-work analysis approach was used to analyse the data (section 4.9.2).

5.4 Results

Interviews were conducted with nine prescribers from AlShaab hospital and three prescribers from Ahmed-Gasim hospital, making a total of twelve prescribers, between May and July 2011. Interviews took between 20-50min. Permission for audio-taping was asked from the interviewees, three of the prescribers preferred not to and hence, the interviews were hand-written during the interviews. Two prescribers agreed to be interviewed in outpatient clinics and the surrounding environment did not allow for good audio taping so the transcribed information depended largely on hand-written notes taken during the interviews. Two interviews were conducted mainly in the English language and another two mainly in the Arabic language. The rest of the interviews were conducted partly in English and Arabic language. The characteristics of the prescribers who took part in the interviews are shown in Table 5.1.

Table 5.1 Characteristics of senior prescribers interviewed

<i>Code</i>	<i>Gender</i>	<i>Years of practice in cardiology</i>
KAG*	F	1
IAS*	M	1
LAG	F	10
BAS	M	19
AAS	M	5
KAS	M	27
MAS	F	12
NAS	M	11
QAS	F	< 1year
ZAS	M	24
SAS	M	12
GAG	M	< 1year

* AG refers to Ahmed –Gasim hospital whereas AS refers to Alshaab hospital

Although the concept of frame-work analysis is to present a summary of the results identified from the interviewees' quotes rather than presenting the actual quotes; to illustrate the themes identified some of the quotes

from the prescribers related to these themes are going to be presented. The interviews together with the identified themes and quotes were reviewed with the research supervisors. One of the supervisors also reviewed part of the analysis technique as it was the researcher's first experience in using N- vivo software.

The quotes were chosen based on statements that could be understood easily and make sense if presented separately. The prescribers' code (from Table 5.1) as well as the line number from the transcribed interviews in N-vivo will be used as a reference for each quote, for example LAG, I33. Some of the quotes were related to more than one theme and this is an illustration of how the issues studied were linked to each other (Carlsen and Norheim, 2005).

The three main themes identified based on the research objectives were:

- Influences on prescribing
- The use of prescribing guidelines
- The role of the hospital clinical pharmacist

Following the frame-work analysis approach, a summary of the above themes were charted based on each individual respondent's comments (see Appendix 5).

5.4.1 Influences on prescribing

In the interviews the prescribers were asked to identify the factors that influence the choice of drugs for their patients. The aim in particular was to identify other factors besides the clinical condition that affect prescribing. Although the assumption was that all prescribers will identify the patient clinical condition as the main criteria before considering any treatment, few prescribers actually mentioned this factor.

“Clinical factors, diagnosis of the patient, and the best treatment to help this patient [...]” (KAG, I22)

The main non-clinical factors identified as affecting prescribing were cost and availability. Almost all prescribers considered the cost of the drug as a major issue in prescribing especially considering that heart disease patients take their medications for life. The cost was also linked with the availability of medical insurance.

“Yes, I have to ask the patient first if he can afford [the drug] then I’ll prescribe the best one [...] in F..Hospital (private hospital) patients have insurance so I can prescribe all the medications.” (IAS, I95)

“Price of the drug, most of heart disease patients take medications for life so the cost is a very important factor.” (BAS, I28)

“Price, affordability, cost effectiveness are major issues here.” (AAS, I14)

Prescribers considered that availability as well as cost affected their drug choice.

“Availability and cost, I am sure if you asked all the doctors they will say the same thing.” (NAS, I10)

“[...] Availability is not reliable in Sudan [...]” (BAS, I29)

“For example I have a patient diagnosed with ‘SVT’, according to any guidelines adenosine is the first choice, I do not have adenosine in Sudan so what am I going to do?” (KAG, I199)

When prescribers were asked about their source of information for availability of the drug, many of them depended on the patients to inform them if the drugs were available in the pharmacies or not.

“From the patients themselves, the patients tell us if the drugs are available or not available.” (QAS, I50)

The cost of the drug was not a factor of concern for some prescribers who saw patients in private clinics.

“Usually patients are different in private [clinics] from hospitals. They usually can afford, so I can prescribe to them [...] for example the most potent even if it was expensive. I can prescribe without a problem.” (QAS, I132)

Other doctors thought that the perception that patients who come to private clinics will be in a better financial state is not always right.

“Not really, people who come to private clinics cannot afford [...] we are actually taking money from poor people.” (SAS, I60)

Generic versus brand name prescribing

The choice of prescribing drugs from certain generic companies versus prescribing known expensive companies' brands of the same drugs was very much linked with cost and the patient's ability to pay for the more expensive brand of the drug.

“Mainly for the cost, I tell the patient there is a drug that comes in two prices, for example, ‘Lescol’ is more expensive than ‘Atorva’ and I ask the patient which one he can afford, usually the patient will be a bit worried and will ask if the cheaper drug is ‘not good enough’ and I say no it is good but may be less side effects with the expensive drug [laugh].” (NAS, I12)

Some of the doctors interviewed thought that the generics were not as effective as the original brand. Others considered that even within the generics there were differences depending on the manufacturing company. Some of the doctors felt that prescribing drugs from certain generic companies will put their patient's life at risk. In spite of this, doctors had to use these companies for many patients as they were more affordable than their other counterparts.

“You cannot tell obviously, but we feel, yes, some brands are not working as effectively, obviously this is a personal perception [...], my perception is that some generic brands are not good. Sometimes the patient when they changed the brand, things went out of control so you get a feeling that the brand was not good.” (AAS, I26).

“Evidence concerning generics is lacking [...] I’ll prescribe the drug with the known trade name otherwise I’ll go with the cheap drug [...] but you have to make sure the patient can afford [it] otherwise he’ll go and tear apart the prescription.” (SAS, I26).

Many of the prescribers referred to the drug clopidogrel, an antiplatelet drug prescribed for many heart disease patients as an example of a drug that had to be prescribed by its brand name ‘Plavix’ as it was considered a risk to prescribe clopidogrel manufactured by generic companies.

“For example ‘Plavix’ (clopidogrel) and we have ‘Clovex’ (clopidogrel), we know that ‘Plavix’ is better and it is confirmed by studies, we know that this brand is better than the other one.” (IAS, I91)

“I prescribe ‘Plavix’ in name because we had a very bad experience with the other one [...], we have stent patients coming back with acute thrombosis.” (SAS, I73)

One prescriber described that he liked his patients to stick to the same brand of drug. He considered that this minimized the chances of confusion happening, as many patients recognized their tablets by their shape, colour and form rather than by the tablet name.

“I like my patients to stick to the same brand they started with, because these patients get used to the tablet which is yellow, the tablet which looks like a heart or the box which is blue [...] and when this is changed they g

confused, you could not imagine how this confusion causes mix up of patients' treatment.”(ZAS, l250)

As treatment in cardiology usually requires follow up to ensure effectiveness and safety of therapy, prescribers were asked about the ease of follow up of patients after discharge. This was considered by some prescribers as a problem and can affect the prescribing of certain medications.

“Yes there is a great problem with follow up. Patients do not stick to the follow up time for many reasons, many are coming from far away” (KAG, l132)

“[...] In Sudan we do not have follow up.” (BAS, l81).

“For example, use of warfarin, I cannot prescribe it as an anticoagulant for somebody who lives in ‘Um’ [a remote place in Sudan] [...], he/she is going to bleed [...] there is no follow up in certain areas even within Khartoum.” (NAS, l29)

Referring patients to clinics outside Khartoum for follow up was not preferred by some prescribers as they cannot ensure the effectiveness of these health centres outside Khartoum.

“Usually people with cardiac disease we like to follow them up in cardiac centres in Khartoum even if they were from outside Khartoum because it is difficult to find things available [in some hospitals outside Khartoum], even to find physicians available.”(KAG, l141).

“Patients had disasters from cough induced by ACEI drugs [...]. Cough was misdiagnosed [in some health centres outside Khartoum]” (AAS, l222).

Some prescribers linked the prescribing of certain drugs that require monitoring with the patient's education or the family understanding of the possible risks accompanying certain drugs.

"In Sudan there is also the factor of patient education" (BAS, I81)

"I have a young patient with pulmonary hypertension, ideally I should give her warfarin, but the family are illiterate and they are living in a far eastern part of Sudan, we cannot risk giving her warfarin." (LAG, I51)

Other factors which were identified by few doctors during the interviews as affecting the prescribers' choice of drugs are shown below in Table 5.2.

Table 5.2 Other factors affecting prescribing

FACTORS AFFECTING PRESCRIBING	QUOTES
Evidence	<i>"No the first is the evidence" (SAS, I38)</i>
Patient choice	<i>"Sometimes patients have preferences to certain trade names" (GAG, I42)</i>
Drug related factors	<i>" To look if there is any drug interactions" (QAS, I47)</i>
Company representative	<i>"I f they[drug company representatives] come frequently, you remember their drug and they need to convince you" (BAS, I31)</i>
Easiness of drug name	<i>"Sometimes I prescribe 'Clovex' [instead of other brands] because it is easy to write and easy to remember"(IAS, I197)</i>

5.4.2 Use of prescribing guidelines

Most of the prescribers agreed on the importance of following guidelines for appropriate prescribing as these guidelines are considered

to be made based on evidence from research. In addition, having guidelines was considered to assist junior doctors in prescribing in spite of the fact that in certain cases it may not be possible to follow guidelines.

“No I think evidence has shown that guidelines based treatment improves survival, improves the outcomes so sticking to guidelines is actually important [...] you as a consultant cannot deal with every patient so once they [the doctors in training] know the guidelines, you have some sort of treatment plan that can be applied to all patients except when there is something outstandingly [different from the norm].” (AAS, I165)

“Appropriate prescribing is the guidelines, if you can stick to the guidelines this is better.” (KAS, I62)

Interestingly, one of the doctors although very much in support of the use of evidence from guidelines to assist prescribing, thought that the lack of evidence does not automatically disqualify the use of a certain treatment. The doctors have thus to understand the evidence so that they could make a judgement about using a certain treatment or a dose which has not got evidence for or against its use.

“Lack of evidence does not mean lack of benefit.” (AAS, I155)

“You need to be careful, the higher doses may have not been tested, you have to be able to read the evidence...sometimes there is no evidence against or for...” (AAS, I159)

The doctors were then asked about following international guidelines in practice in Sudan. The majority considered it possible to use international guidelines for prescribing in cardiology but they have to adapt these guidelines to the environment in Sudan.

“Yes I can apply most of the international guidelines in Sudan [...] simply because we do not have our own guideline.” (IAS, I142))

“Guidelines with a grain of salt, guidelines have to be adapted to local environment, and that’s what experience is.” (AAS, 145)

An example where there is a need to use the guidelines in a modified way is when the recommended treatments are not available in Sudan.

“I cannot prescribe the new drug Li.... which is not found in Sudan. We stick to guidelines but with a modified picture.”(SAS, 1130)

“For example I have a patient diagnosed with ‘SVT’, according to any guidelines adenosine is the first choice, I do not have adenosine in Sudan so what am I going to do?” (KAG, 1199)

As guidelines recommendations usually involve follow up of treatment, this may not always be practical in Sudan.

“Guidelines sometimes recommend for example renal function tests every two weeks or three weeks, this is very costly [for the patient] we cannot be dogmatic.” (SAS, 1148)

“For example, use of warfarin, I cannot prescribe it as an anticoagulant for somebody who lives in ‘Um’ (a remote place in Sudan) [...] he/she is going to bleed [...] there is no follow up in certain areas even within Khartoum.” (NAS, 129)

For some doctors it was considered not mandatory to follow international guidelines recommendations step by step.

“As long as I am within the room of the guidelines, there is no problem, but never stick to it word by word.” (SAS, 1211)

“Some research from India showed that we do not need to do regular liver function tests as promoted by some international guidelines after prescribing statins [...], personally I am interested in practicing cardiology for limited resource settings.” (AAS, 1114).

Other doctors considered that overall, international guidelines are not suitable to be applied on Sudan.

“They do not cover our situation in Sudan.” (NAS, I29)

“We should not be bringing foreign guidelines and say we want to implement them.” (ZAS, I439)

One of the prescribers was against following any guidelines in practice in Khartoum hospitals. He considered that guidelines are meant for health systems with standard services. While some hospitals in Khartoum can perform certain investigational tests others cannot because of limited resources, so it is difficult to unify treatment.

“These things that we call guidelines, there are rules [...], if the conditions are not available you cannot implement it, if we still do not trust the blood film for malaria, proper urine analysis, proper reading of body temperature[...] just imagine the way we are working. Of course if things were organised, everything available, guidelines can work but this is not there and I don't think in the coming fifty years it will [...] this all needs money.” (ZAS, I390)

When prescribers were asked about prioritizing guidelines recommendation over personal experience or the other way round, they had different opinions.

“Guidelines, absolutely, I tell them [junior doctors] ‘Do and Do not’ in guidelines, after that comes my experience which they [junior doctors] see it by themselves. But I follow guidelines unless there is something else that makes me not to follow it.” (SAS, I182)

“So far my experience is rather short, six years, so I stick to guidelines.” (KAG, I128)

“You need to take both [guidelines and experience] obviously [...] I never do something out of experience which has not got evidence, if I do that I do that in rare situations, as a clinician in areas where there is no evidence you are allowed to use that [experience] but if the evidence is clearly against or with a drug I don’t pay attention to my experience, but generally I do not find problems with both.” (AAS, I146)

Some prescribers also linked experience with therapeutic traditions which was considered to precede guidelines.

“All my colleagues use ‘Amiodarone’, I use ‘Digitalis’ of course old school [...] I have long experience with digitalis, 32 years, I know its benefits, do you get me?” (ZAS, I409)

“[For prescribing] I use what is known and common and according to my experience”(MAS,I22)

For some doctors experience was not necessarily personal experience but it was also of importance to consider the senior colleagues experience.

‘Experience is more important than guidelines, especially if the experience is from a trustworthy person because studies were built on restricted conditions.’ (BAS, I53)

“We ask the seniors for their experience.” (KAG, I122)

“I personally will take the boss [senior consultant] opinion in this stage.”(QAS, I203)

As one of the doctors mentioned earlier that the use of international guidelines is due to the lack of national guidelines, prescribers were asked about the availability of national guidelines in cardiology. Some of the doctors confirmed that there are Sudanese guidelines for hypertension. Others considered that there may be some national guidelines but they could not verify if they were actually implemented in practice.

“Only for hypertension, there are no other guidelines.” (KAG, I92)

“There are but not updated [...] guidelines. In most of the doctors meetings they do talk about the need to have Sudanese guidelines.” (NAS, I35)

Other prescribers were sceptical about the attempts made by some doctors to make national guidelines.

“How to write a guideline is a big issue, you cannot leave it for two or five persons to do it, they need to have the background, to look into RCTs, otherwise it will be copying.” (KAS, I68)

“[...] the national guidelines for me they are not working.” (BAS, I64)

As well as discussing the key influences on prescribing such as guidelines, respondents were also asked about clinical pharmacists in the hospital as an influence on prescribing and their role in patient management.

5.4.3 Role of the hospital pharmacist

Prescribers who were supportive of a role for the pharmacists in the hospital thought that this role should be of clinical nature.

“Most of the pharmacists in the hospital should be clinical pharmacists....they should be part of the team managing the patient [...].” (IAS, I206)

“Well they should be available, come to us, tell us [...] prescribe this instead of this” for me I think that they are not fully getting what they deserve.” (QAS, I222)

Other prescribers considered that the contribution required from the pharmacist is mainly to do with identifying side effects and interactions of drugs.

“I like to benefit from the pharmacists especially with regard to drug interactions.” (MAS, I53)

“I found them very useful; first thing they know side effects of the drugs and interactions.” (KAG, I172)

Although there were clinical pharmacists appointed in both hospitals, there was a more positive experience from some doctors in Ahmed-Gasim hospital than in Alshaab hospital with the role of clinical pharmacists in their hospitals as shown in Table 5.3.

Table 5.3 Responses of senior prescribers about pharmacists' role

AHMED-GASIM HOSPITAL	ALSHAAB HOSPITAL
<i>“I found them very useful, first thing they know side effects of the drugs and they know interactions” (KAG, I172)</i>	<i>“I know they say that there are clinical pharmacists but I did not see them” (BAS, I134)</i>
<i>“We are trying with the clinical pharmacist to make our guidelines here [in hospital] derived from the American guidelines” (LAG, I45)</i>	<i>“We do not have[clinical pharmacists] here in the hospital” (AAS, I261)</i>
<i>“Yes for example we have a patient now on Vancomycin and we asked the clinical pharmacist to check the dose” (GAG, I63)</i>	<i>“No there is no contact we do not see them and they do not see us (NAS, I48)</i>
<i>“Here we really work as a team with the pharmacist. I am really happy with the work that N [clinical pharmacist] is doing. We ask her about many drug related issues” (LAG, I101)</i>	<i>“No, zero pharmacist role, I do not want to lie to you” (SAS, I262)</i>

Although most of the prescribers were in favour of a contribution from the pharmacists in patient care, a large number of doctors were still not in contact with the clinical pharmacists.

“We do not see them.” (IAS, I214)

“I did not see any [pharmacists] personally nobody approached me.”
(QAS, 195)

Some prescribers considered that it is the pharmacists' responsibility to convince the doctors that they could have positive contribution to patient care.

“But the pharmacist himself, if he did something to convince the doctor that he/she is useful.” (ZAS, 1519)

The same doctor had views that pharmacists lack confidence in themselves and the knowledge they have.

“They think that they are less than the doctors and cannot be involved with them [...] on the contrary the information they have we can make use of it.” (ZAS, 1505)

In Alshaab hospital a medicine information office was found which was used by some pharmacists as their main office. When prescribers were asked if they used the medicine information service before, some were not aware of its existence while others thought that it was no longer working.

“Not at all and I do not think any of the doctors have ever dealt with it.”
(IAS, 1271)

“We used to visit them regularly [...] now this service has stopped.”
(ZAS, 1465)

“I did not see it, are they working?” (AAS, 1279)

Some prescribers have attributed the lack of contribution from hospital pharmacists in patient management to a perceived deficiency in the undergraduate pharmacy education.

“The basic teaching of pharmacy in this country lacks important clinical subjects [...] that is why they are not contributing.” (BAS, I127)

One of the prescribers thought that there may be a relationship between the lack of contribution of hospital pharmacists and the absence of national clinical guidelines. Although it was an interesting statement considering the research objectives, the researcher missed the opportunity to discuss this assumption further.

“The absence of guidelines also affects the contribution of pharmacists.” (NAS, I53)

In a different discussion about a future role for the pharmacists in Sudan to prescribe, this was not yet favoured by a number of doctors with whom this issue was brought up. Some considered it to be a risk as it would be more difficult to identify the individual who prescribed. Some doctors were more accepting for prescribing if it was for minor ailments.

“It is difficult in Sudan, how can you trace prescribers” (SAS, I287)

“It can be for simple things like analgesics.” (QAS, I271)

After examining prescribers' views in relation to the factors affecting current prescribing and the role of the hospital pharmacist, doctors were asked at the end of the interviews about their thoughts regarding what is missing from their hospitals in order to achieve appropriate prescribing.

“In Sudan one of the problems is that we do not have records, patients come to the hospitals and we do not know which drugs they were taking.” (BAS, I100)

“There are a lot of medication missing [...] what I'd like to see is that all patients get access to medication.” (AAS, I291)

“To get drugs supplied free of charge.” (NAS, I56)

One of the prescribers was ambitious to see guidelines made based on studies on Sudanese patients.

“We need to do our studies because responses of our own patients may be different from outside.” (KAG, I206)

Summary of the results:

- Cost and availability of drugs were the main factors influencing prescribing in the cardiac hospitals
- Most of the doctors were positive about following guidelines in prescribing
- International guidelines were used in prescribing but limitations existed to their use
- Some national guidelines were available but were not used in practice
- Few doctors were depending on experience more than guidelines as they perceived that it is not possible to follow guidelines in practice in Sudan
- Prescribers were positive about a clinical role for the hospital pharmacists even if they have not yet seen any contribution from these pharmacists

5.5 Discussion

The prescribers' views explained a number of issues that were observed on the wards and clinics with regard to choice of medication; follow up of cardiology guidelines and the pharmacist-doctor relationship in the hospital. The main findings of this stage of the study will be summarized below in addition to discussion of these findings. Further discussion of the results will also be continued in the final chapter of this report in relation with the results from the other methods used in this study.

Influences on prescribing

The costs of drug treatment for the patient were considered to be the main factor affecting drug choice in government hospitals. Although some prescribers perceived the cost to be less of an influence when patients were seen in private clinics, this may not always be true in Sudan. Patients may go to private clinics/hospitals even though they are struggling with their finances because their expectation is that private healthcare will provide them with a better service compared to that in government hospitals.

Unlike prescribers in cardiology in the UK for example, whom their decision to prescribe was influenced by the costs of treatment to the healthcare system (Greenfield et al., 2005), the prescribers in Sudan seemed to be mainly concerned about the cost implications of healthcare to the patient. It is the perception of the researcher that the majority of the Sudanese people consider the government as scarcely spending on the healthcare system and is not meeting any of the demands for better health care in government hospitals. Thus the burden of the healthcare costs usually lies on the patient and the family. Even in government hospitals and as was observed during this study, the patients were expected to pay for many of the services provided including drugs, which although much cheaper than private hospitals, it was still considered hardly affordable for many.

The issue of drug cost was linked with the availability of medical insurance in the country. Since the participant hospitals are government hospitals, the majority of the patients seen in these hospitals are financially disadvantaged. Some of these patients may have enrolled in the government medical insurance scheme but many are not (section 2.9.2). During the time spent in Sudan for data collection, it was noticed that the government was using the media to encourage people to enrol in its medical insurance scheme. The problem, as perceived by the researcher, is that the expectation of many Sudanese people towards the

idea of the government medical insurance solving the problem of the costs of healthcare for financially vulnerable citizens, is far from being positive. The people in Sudan tend to expect inefficiency and bureaucracy in services linked with the government. The problem of financing health services in many countries in sub-Saharan Africa is known to be critical and requires joint work, between the government, the community and the private sector (Korte et al., 1992).

Prescribers were concerned that in their attempts to prescribe drugs from cheaper companies to some patients they were compromising on the effectiveness of the treatment. This concern was shared by other prescribers in cardiology in other parts of the world whereby in spite of the evidence available of bioequivalent clinical effectiveness, many doctors as well as patients doubted the claim that generic and 'branded' cardiovascular drugs are similar in effectiveness (Kesselheim et al., 2008). A common example mentioned by the prescribers in this study was the drug clopidogrel, brand name 'Plavix', used as an antiplatelet for most heart disease patients. 'Plavix' was very expensive and not available under the national insurance scheme in Sudan. This issue of generic clopidogrel as discussed by several prescribers led to a search into the literature for relevant information. A number of studies were found comparing the effects of different trade names of generic clopidogrel versus the brand drug 'Plavix' in patients with ischaemic heart disease or stent implantation (Ashraf et al., 2005, Park et al., 2012, Tsoumani et al., 2012). Although these generics may be different from the ones imported to Sudan, similar effectiveness was described between certain generics and the brand drug. However, the studies affirmed the need for larger studies to document similar bioequivalence.

The availability of drugs in Sudan was considered by prescribers to be irregular and thus affected the choice of drugs. Drug companies commonly experience difficulties of supply and therefore, it is common in Sudan to experience a shortage in certain drugs. This is many times linked with the

unstable economy in the country as the majority of drugs are imported. The supply problems of drugs in many countries in Africa is known to have a negative impact on health care but technical and logistical issues in addition to financial limitations are argued to contribute to the problem (Jahre, 2012). Prescribers also explained that it was usually the patient and not pharmacy staff who notified them about supply problems. This may well be due to lack of exposure of doctors to the pharmacists in the hospital. This issue will be further studied and discussed in the following chapters.

Many prescribers also agreed that the follow-up of patients can be a problem in Sudan. Many of the patients were coming from different parts of the country to these specialized centres in Khartoum and it is difficult to make sure that they would come back for follow up. Relying on health care centres outside Khartoum was considered by some prescribers as not an option because of a perceived lack of efficiency in these centres. The link between hospitals and primary care centres is known to be almost none existing in Sudan. Prescribers had to depend on the patient and the patient's family to understand the importance of follow up. In Sudan the patient's family are usually involved in the treatment process. During preliminary observation it was found that the patient personal care including administration of oral drugs was to a great extent transferred to family members once the patient was on the ward and not in a critical condition.

The factors identified by prescribers as affecting their prescribing decisions were similar to those found in other studies carried in many parts of the world including Europe and the United States (Ljungberg et al., 2007, Nutescu et al., 2005, Schumock et al., 2004, Theodorou et al., 2009, Greenfield et al., 2005). These included, in addition to the cost implication of treatment, the influence of senior colleagues on prescribing, information from the drug company representatives, the pharmacist, the doctor's experience, the work place and guidelines recommendations.

However, in many of these other studies, there was less emphasis on cost and availability when compared to clinical effectiveness and the patient's indications. This is likely to do with the type of healthcare system available in these countries and how patients pay for their treatment. For example, in the United Kingdom (UK), where some of the above studies were conducted, the National Health Service (NHS) is known to provide almost free healthcare to all patients resident in UK with no medication charges for patients admitted to hospitals. The effect of these factors on prescribing will be investigated among a larger group of doctors in the cardiology hospitals in chapter 6.

Use of guidelines in prescribing

During preliminary observation on the wards of Alshaab and Ahmed Gasim hospitals, it was noticed that the drugs prescribed were related to the recommendations of some of the international guidelines in cardiology. Most of the prescribers interviewed considered that they use clinical guidelines when prescribing for their patients. For some prescribers following guidelines was the way to appropriate prescribing. This is similar to what some has considered to be the goal of appropriate prescribing and that is to narrow the gap between scientific evidence and clinical practice (Brook et al., 1986, Buetow et al., 1997). This goal is one of the main advocated reasons for implementing clinical guidelines (Feder et al., 1999, Hewitt-Taylor, 2006, Woolf et al., 1999).

The prescribers mostly depended on foreign clinical guidelines, American, European or British for the treatment recommendations. However, there were limitations to the use of these guidelines linked with the other factors that affected prescribing which were mentioned earlier for example cost, availability and possibility of follow up.

It has been argued that for guidelines to be followed they need to consider the patient perspective as well as the environment of the healthcare in which they are applied (Hajjaj et al., 2010, Keeley, 2003, Montori and Guyatt, 2008, WHO, 2007a, Woolf et al., 1999). Thus for

prescribers in Sudan who are currently using international guidelines presumably written with other types of patients and healthcare systems in mind, it is to be expected that these guidelines may not be appropriate for patients in Sudan. Prescribers were thus referring to the international guidelines of their choice but only choosing from the guidelines what can be applied considering the healthcare system of the country and the type of patients they treat. This sometimes involves disregarding recommendations for regular monitoring following prescribing certain drugs as considered not practical in Sudan. Considering the resources required and the high cost involved in making completely new guidelines (Feder et al., 1999), adapting international ready-made guidelines to local settings can be considered as a practical approach to treatment in Sudan. However, this adaptation although may incur benefits beside the limitations, can also be argued as a manipulation of the international guidelines to suit the system in Sudan and this may compromise the benefits and safety expected from guidelines recommendations. As argued by Fried and Krabshuis (2008), the idea of having a 'cascade' of guidelines in which certain recommendations of the guidelines are followed and others are disregarded, can endanger the whole idea behind EBM.

During this study a copy of the Sudanese Hypertension Guidelines was found available online ((SSH)), 2012). The guidelines were published by the Sudanese Hypertension Society and the Federal Ministry of Health Directorate for Non-Communicable diseases. Some doctors confirmed the availability of national guidelines in hypertension in Sudan, others heard about them but they had not actually seen them. It is unfortunate that although an effort was made to make some national cardiology guidelines, they were not actually used in practice. This could have been a starting step for doctors and healthcare professionals to start using national guidelines and to test their suitability for practice in Sudan. On the other hand, some of the senior prescribers doubted the suitability of the national guidelines based on the limited capabilities and training of those involved in making them. These issues about the skills and resources required for

guideline making committees were previously raised by other authors (Feder et al., 1999). There should be a known process within healthcare authorities to develop guidelines. The criteria for making the guidelines should be well defined and the persons involved should have the required skills and experience that produce a guideline with the best evidence available that can be implemented.

Overall, the use of guidelines in prescribing was considered by the prescribers as a positive aspect in treatment. A few prescribers considered that national or international guidelines cannot be applied in Sudan. The prescribers questioned the readiness of the healthcare system in Sudan for the uniformity of treatment promoted by guidelines. This was due to what they thought was a wide variation in services between the different hospitals as a result of limited funding in some hospitals and lack of medical devices and trained staff. However, the argued risk of not having a uniform approach to treatment is that unjustified variation in prescribing may occur and patients can miss the perceived benefits of guidelines recommendations (Ljungberg et al., 2007, Wolf et al., 1999).

Prescribers were divided between whether following guidelines is the primary influence on treatment decisions, whether clinical experience comes first or as some suggested, experience was rooted in guidelines recommendations and thus a link exists between the two. Although clinical experience based on the number of years of practice is expected to lead to accumulation of knowledge and skills and hence have a positive effect on patient care; this may not always be the case. Some evidence suggested that doctors with longer years of practice demonstrated a decrease in quality of healthcare compared to those with fewer years of practice (Choudhry et al., 2005). Part of the reason for that was argued to be that older generations of doctors are either resistant to change their traditional practice or are less likely not to keep up with the up to date recommendations for treatment. In addition, the education and training of the older generations of doctors can be an element in them following a

certain approach in treatment that prioritize personal experience over following new recommendations for treatment.

In a study by Schwartz et al (1989) some prescribers considered that when they disregarded guidelines was because their experience in the use of certain drugs had come from real life situations in contrast to the evidence from clinical trials which was sometimes set in academic institutions. In addition, prescribers in some situations had to submit to patient demands and prescribe 'non-scientifically' (Schwartz et al., 1989). Other reasons argued for prescribers not to follow guidelines are because of a deficiency ,or a perceived deficiency, in the guidelines, a lack of trust in the guidelines or a perception that the guidelines take away the prescribers' autonomy (Cabana et al., 1999). This is similar to the views of few of the senior doctors in Sudan with decades in clinical practice who preferred to rely on personal experience more than recommendations by guidelines. For these prescribers, the international guidelines were not considered fit for their patients or the healthcare system in Sudan, and on the other hand they did not trust the available national guidelines. One of the suggested ways to enhance the use of guidelines is to present them in advance to those who will be using them to discover beforehand any possible concerns for their implementation that can be addressed (Scott et al., 2004).

Interestingly as part of the aim of this study is to look into the influence of guidelines on the role of clinical pharmacists in the hospitals, one of the doctors identified the absence of guidelines as hindering the contribution of pharmacists in the hospitals. However, as this matter was not pursued further with the prescriber, it is difficult to interpret the reasons behind his comments. As the notes for this particular interview were hand written, this may have distracted the researcher from following the argument and thus pursuing the above claim further.

Although there are limited studies on the positive or negative effects of clinical guidelines on pharmacists, it may be that the availability of

guidelines will have similar effects on pharmacists as that on prescribers. There are argued benefits as well as disadvantages to prescribers from having clinical guidelines such as enhancing professionalism and saving prescribers' time to develop further skills or deskilling prescribers and make them lose their autonomy (Berg, 1997, Berg, 2000, Woolf et al., 1999). The perceived influence of availability and use of guidelines on clinical pharmacy practice in Sudan will be further discussed in chapters 7 and 8 after examining the views of clinical pharmacists.

Role of the hospital clinical pharmacist

There were varying responses between the two hospitals with regard to any existing contribution to patient management from clinical pharmacists. The prescribers of Ahmed-Gasim hospital (AGH) had more positive responses than the majority of the consultants in Alshaab hospital (AH). This difference in opinions can be the result of two factors, first, there was one pharmacist in AH appointed for the cardiology department which has more than 60 prescribers. In AGH, there was one pharmacist in cardiology in a unit of 20 prescribers. This made the exposure of physicians to the clinical pharmacist much more likely in AGH. Exposure of the physicians to clinical pharmacists in hospitals was shown to have a positive effect on their perceptions towards pharmacists' contribution to patient care (Ritchey and Raney, 1981). In addition, the clinical pharmacist who was appointed to the cardiology unit in AGH had been in her current post for four years in contrast with the pharmacist in AH who was a clinical pharmacist for only one year. Description of the clinical pharmacists in the two cardiology hospitals is provided in chapter 7.

The positive view of the prescribers towards the role of the pharmacists working in hospitals was discussed in a previous study in Sudan in 2004 (Awad, 2007). The study showed that most of prescribers were not in contact with pharmacists in the hospital as in the case of Alshaab hospital, but had positive expectations that pharmacists' could have a positive contribution in hospitals. Furthermore, the findings of this study were in agreement with Awad (2007) in that the expectation of doctors

were more positive towards certain roles such as, identifying side effects and drug interactions and more resistant to advanced roles such as pharmacist prescribing. These findings will be further explored in the next chapter when the views of a larger population of prescribers were obtained.

It was expected that with the recent introduction of the clinical pharmacy role in hospitals, the effect of pharmacists would be more noticeable. However, it seems that pharmacists are still not presenting themselves enough on hospital wards and clinics. Furthermore, although some pharmacists were providing a medicine information service in AH, the service seemed not to be advertised enough for the prescribers to be aware of its existence. The reason for that could not be determined but one can argue that part of the problem is due to lack of resources and possibly non-continuity of the service. During preliminary observation it was noticed that the pharmacists were not available in the medicine information office at all times. Medicine information can be a great opportunity for pharmacists to present themselves by providing written as well as face to face information that can be of great use to all healthcare professionals.

Although the majority of prescribers interviewed did not object to have clinical pharmacists contributing to patient care, a few doubted if pharmacists are ready yet to do so. Different reasons were considered by the prescribers as causing the limited contribution of pharmacists in the hospitals. These included deficiencies in the undergraduate pharmacy course in providing the relevant background, and pharmacists themselves not being confident enough to show their knowledge especially when they are dealing with doctors. To examine and discuss these perceptions about the pharmacists, the views of more prescribers as well as pharmacists were pursued as will be discussed in the following chapters.

5.6 Limitations and strengths of the interviews

As it was the first experience for the researcher in conducting interviews, there may have been many times where opportunities for probes and prompts were missed which could have added more to the information gathered. The researcher's ability in conducting interviews was at a very early stage and this may have had an effect on the prescribers' responses or the information that could have been obtained. However, improvement in the interviewer's skills was felt as more interviews were conducted. On the other hand, the fact that the researcher is a pharmacist may have created bias in the prescribers' responses.

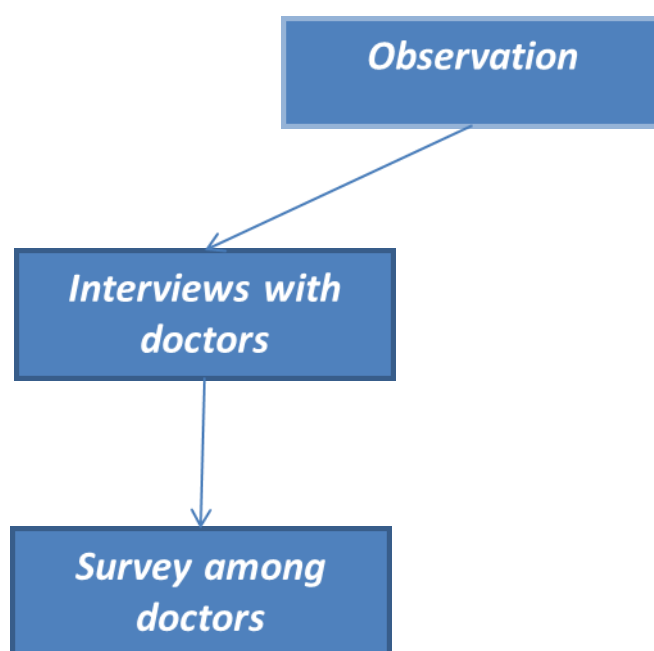
Another limitation is that as it was not possible to interview all senior prescribers in the two hospitals, it is not known if those who were not interviewed had different opinions to add to the issues examined. In addition, it cannot be confirmed that saturation was reached. It is argued that in many qualitative studies it is problematic to confirm the stage of saturation (Brod et al., 2009, Guest et al., 2006). Some authors suggested that in a relatively homogenous group the vast majority of the concepts to be identified (92%) can be reached after twelve interviews (Guest et al., 2006). This can relate to this study as the majority of the data obtained from the interviews became repetitive as approaching the final interviews.

Furthermore, some of the interviews were not recorded due to either the prescriber request or the interview was carried out in a noisy clinic. The data provided from these interviews may not be as rich as the recorded interviews.

Finally, some of the interviews were translated from Arabic to English. The results were then presented in a way that would make sense to a reader in the English language rather than word by word translation, hence, the verbatim transcription may have been compromised. This is known to be a challenge in multi-lingual research as word-equivalence

between languages is not always possible (Al-Amer et al., 2014, Im et al., 2015). However, understanding the culture behind the language used when translating as in the case with this study, is considered to be an advantage and helps to add trustworthiness to the findings.

CHAPTER 6 SURVEY ON INFLUENCES ON PRESCRIBING IN SUDAN AMONG CARDIOLOGY PRESCRIBERS



6.1 Introduction

This chapter discusses the next phase of this study which is the survey that was conducted among the prescribers in the two participating hospitals. After the interviews, a questionnaire was developed to further explore the research objectives among a larger population of prescribers within the cardiac hospitals. These objectives include the factors affecting prescribing, the use of guidelines in prescribing and the role of the clinical pharmacists in the hospitals. This chapter presents the method involved, the results obtained, discussion of some of the findings and the limitations of this phase of the study. Further discussion of the key findings of this phase will be presented in the final chapter of this study.

6.2 Method

A cross-sectional survey was used to collect data for this stage of the study. A questionnaire was developed which followed a five-point Likert scale type of design (section 4.8.3.1).

6.2.1 Sampling of participants

The population for the survey was all the doctors working in the two hospitals, Alshaab and Ahmed Gasim hospitals, at the time of conducting the survey. However, it was difficult to get an exact number of the total doctors available in the hospital. From previous visits to these hospitals before the start of data collection in December 2010, the total number of doctors who were expected to be prescribing in cardiology in the two hospitals was around 80 prescribers (section 4.10.2). Before delivering the questionnaires another attempt was made to get information about the exact number of doctors in each hospital.

In Alshaab hospital a large number of the doctors were not actually based in the hospital but due to their training program they were only in the hospital for a limited period of time. The hospital management could only provide the number of doctors who were actually based in the hospital. There were six cardiology units in the hospital. The number of doctors varied between the different units but was in the range of eight to eleven doctors per unit. Each unit was approached and a member of the team was asked about the number of the doctors in the unit. The estimated total number of doctors in cardiology was around 60 doctors in Alshaab hospital which was the same number identified from earlier visits. In Ahmed-Gasim hospital, which is a much smaller hospital than Alshaab hospital, there were four cardiology units in the hospital; each unit had five doctors. There were two other doctors identified as rotational doctors making the total number of doctors in the hospital to be 22. Thus the total targeted population of prescribers in the two hospitals was 82 doctors.

6.2.2 Developing the questionnaire

The questionnaire was developed based on the objectives of the research, the prescribers' views identified from the interviews as well as the relevant literature (Table 6.1). Part of the survey questions were adapted, and later modified for the purpose of this study, from previous surveys in the literature on relevant topics (Theodorou et al., 2009, Awad, 2007, Nutescu et al., 2005, Schumock et al., 2004). Other questions particularly in relation to the use of guidelines in prescribing in Sudan were purposively constructed to investigate some of the research objectives. The questionnaire comprised of four main areas of inquiry in addition to the personal information of the participants. These areas were sources of information, factors affecting prescribing, use of guidelines and the role of the clinical pharmacist in hospitals. The personal information of the prescribers were chosen to enable examining some possible associations

between the participants' characteristics and their response to the areas of inquiry.

Table 6.1 Sources of areas of inquiry in the questionnaire

AREAS OF INQUIRY	SOURCES OF AREAS OF INQUIRY
Sources of information	Interviews, literature (Theodorou <i>et al</i> , 2009, Oshikoya <i>et al</i> , 2011), Interviews
Factors affecting prescribing	Literature (Theodorou <i>et al</i> , 2009, Greenfield <i>et al</i> , 2005, Schumock <i>et al</i> , 2004, Nutescu <i>et al</i> , 2005, Ljungberg <i>et al</i> , 2007), interviews, objectives of the study
Use of guidelines in prescribing	Objectives of the study, interviews, literature (Theodorou <i>et al</i> , 2009)
Role of the hospital pharmacist	Literature (Awad <i>et al</i> , 2007 Smith <i>et al</i> , 2001), interviews, objectives of the study

6.2.3 Piloting the questionnaire

The questionnaire was piloted among a number of Sudanese doctors. The pilot study was used to ensure that the questionnaire makes sense to the doctors in Khartoum with regard to the English language used and relevance of the issues encompassed to ensure content and construct validity. There were two pilots arranged for this study; a preliminary pilot in UK during the first stages of preparation of the questionnaire and a second pilot in Sudan before the final copy of the questionnaire was developed. The preliminary pilot was conducted with four Sudanese doctors working in the UK with previous work experience in Khartoum hospitals. None of the prescribers in this pilot were currently practicing cardiology. A first version of the questionnaire was mailed to four prescribers in UK who were known to the researcher and they were asked to comment on the suitability of the questions for doctors in Sudan.

The questionnaires were returned by post to the researcher. One prescriber apologized for not participating as he was not familiar with cardiology issues. The other three prescribers provided useful comments regarding the easiness or difficulty in understanding the questions. The prescribers also thought that the questionnaire made sense to them but they could not predict the same response with the prescribers working in Sudan. These questions which were found by the prescribers as difficult to understand were amended in an effort to make them clearer. A new version of the questionnaire was then prepared to be used for the second pilot.

Three months after the preliminary pilot, and in May (2012), the questionnaire was piloted in Sudan amongst prescribers in cardiology in one of the teaching hospitals in Khartoum (Soba hospital) affiliated to the University of Khartoum. The hospital has a small cardiology unit comprising of five doctors and it is known for providing training for pharmacists undertaking the postgraduate course in clinical pharmacy provided by the University of Khartoum (section 2.12.2). Prescribers were hand delivered a full copy of the questionnaire including the covering letter in addition to a specific letter for the pilot to comment on content, structure and suitable language. Four cardiology prescribers out of the five identified in Soba hospital participated in the pilot study. The questionnaires were collected after ten days. The prescribers commented on the questions that they found not straightforward to understand. Amendments were made to these questions with regard to the language used when preparing the final version of the questionnaire (Appendix 6). With regard to the construct of the questionnaire, two prescribers questioned the suitability of the questions regarding the role of the clinical pharmacists as they were considered to be rarely available. This was expected as the role is relatively new in Sudan and therefore, no changes were made to these questions.

6.2.4 Administering and collecting the questionnaire

There were very limited options in how the questionnaires were going to be delivered and collected in these hospitals. No pigeon-holes were identified in the hospital and people rarely depend on the post to get things delivered within Khartoum. For these reasons, all questionnaires were hand delivered to the prescribers. For a few of the senior prescribers who were not available most of the time, the questionnaires were left in their offices or given to their secretaries.

The prescribers were targeted by their units. In Alshaab hospital a member of each unit was approached, usually the senior consultant, if available, who was informed about the research and asked about the best way to distribute a questionnaire to the group. Some units had tutorials running weekly. Others did not have tutorials, especially during the month of Ramadan (fasting month) which was when the questionnaires were distributed. Distribution of the questionnaires had to be started in Ramadan due to the time allocated for data collection for this phase of the study in Sudan. Cardiology units which did not have tutorials were then targeted in the outpatient clinics, accident and emergency ward (A&E), coronary care unit and the echo-cardiology laboratory. The same unit was visited twice, in A&E and the ward to make sure that the majority of the team members were approached. In Ahmed-Gasim hospital questionnaires were more easily distributed as it is a smaller hospitals with a smaller number of prescribers, . Prescribers in the cardiology units were targeted in two areas, outpatient clinics where the junior prescribers were likely to be and the echo-cardiology laboratory for the senior prescribers.

Seventy-two questionnaires were distributed in both hospitals. This number represents the prescribers who were available in the units during the time of the questionnaire distribution, in addition to some of the senior prescribers who were not found in person but were left with a questionnaire copy with their secretaries. The prescribers were asked to

identify their preferred way for questionnaire collection. The majority agreed on a date for collection, some preferred to leave the questionnaire in a designated place in the hospital, for example, in the management office or with the unit secretary and the rest preferred to complete the questionnaire immediately and hand it back to the researcher. Most of the time, the questionnaires were not ready on the agreed date of collection. A reminder for the prescribers who did not hand in the questionnaires was given and another date was set.

The distribution and collection of the questionnaire took six weeks between June-July of 2012. Each individual cardiology unit was reminded verbally once about the questionnaire completion after one week of distribution. The first response was the highest response although the reminder was also of benefit in getting more participation. The following recommendations were followed in order to increase the response rate (see section 4.8.3.1).

- Participants were informed about the study in advance through their consultant or a member of the team
- Presentation of the questionnaires was on green paper for the questionnaire and white paper for the covering letter to make it easily recognizable
- The questionnaire had no identification numbers or any personal questions for example, date of birth
- Time and place of contact was carefully chosen to suit the prescribers and as much as possible not to interfere with their working schedule
- There was a personal reminder to the units within a short period of time of a week to two weeks
- On reminder, prescribers who were not sure where they placed the questionnaire were given another one

It was not possible to deliver the questionnaires to the whole population of cardiology prescribers in the two hospitals for different reasons. Some

prescribers were on holidays or were just not available on the designated days of questionnaire distribution for different personal or work related reasons. A few of the senior prescribers were known to be rarely available in the hospital due to other commitments outside the hospital and their units were usually run by the next senior doctor available.

6.3 Analysis of the questionnaire

The questionnaire was analysed using the software SPSS version 18. Descriptive analysis was conducted and the values reported as percentages as well as numbers due to the small number of participants which was less than 100. Conbach's alpha (α) was used to measure the internal consistency of the set of questions in the questionnaire examining guidelines and the role of the pharmacist (section 4.9.3). Kendall tau-b was used to test for association between some dependant variables and the independent variables. The Mann–Whitney test was also used to explore any differences in responses between the prescribers based on gender and their experience outside Sudan.

6.4 Results

Forty-three prescribers, out of the 72 questionnaires distributed, participated in the survey providing a total response rate of about 60%. The mean response rate from physicians in public surveys in the published literature was found to be about 54% (David A. Asch, 1997). Fifty-two questionnaires were distributed in Alshaab hospital and 20 in Ahmed - Gasim hospital (Table 6.2). Thirty questionnaires were collected from Alshaab hospital and 13 from Ahmed Gasim providing a response rate of 58% and 65% respectively. Forty-one questionnaires were fully completed with no missing values. All 43 questionnaires were entered for analysis into SPSS where missing values were accounted for.

Table 6.2 Summary of prescribers' response results

HOSPITAL	TARGETED NUMBER OF PRESCRIBERS	NUMBER OF QUESTIONNAIRES DISTRIBUTED	NUMBER OF RESPONDENTS	RESPONSE RATE (%)
Alshaab Hospital	60	52	30	58
Ahmed Gasim Hospital	22	20	13	65
Total	82	72	43	60

Non-respondents

Twenty-nine prescribers out of 72 did not respond to the survey. Some of the prescribers had shown their reluctance to participate based on their full schedule but were still given a questionnaire in case they could find the time. Most of these were the senior consultants. The questionnaire was administered to 11 of the senior consultants out of a possible 17 but only four consultants responded to the questionnaire. For the rest of the prescribers who did not respond, some accepted the questionnaire and agreed on dates for collection but they did not remember to bring the questionnaires with them on these dates. Another date was agreed but again the questionnaires were not delivered. Two other prescribers seemed not keen to participate in the questionnaire and although they accepted the questionnaire, they did not show any willingness to suggest any date for collection.

Participants' characteristics

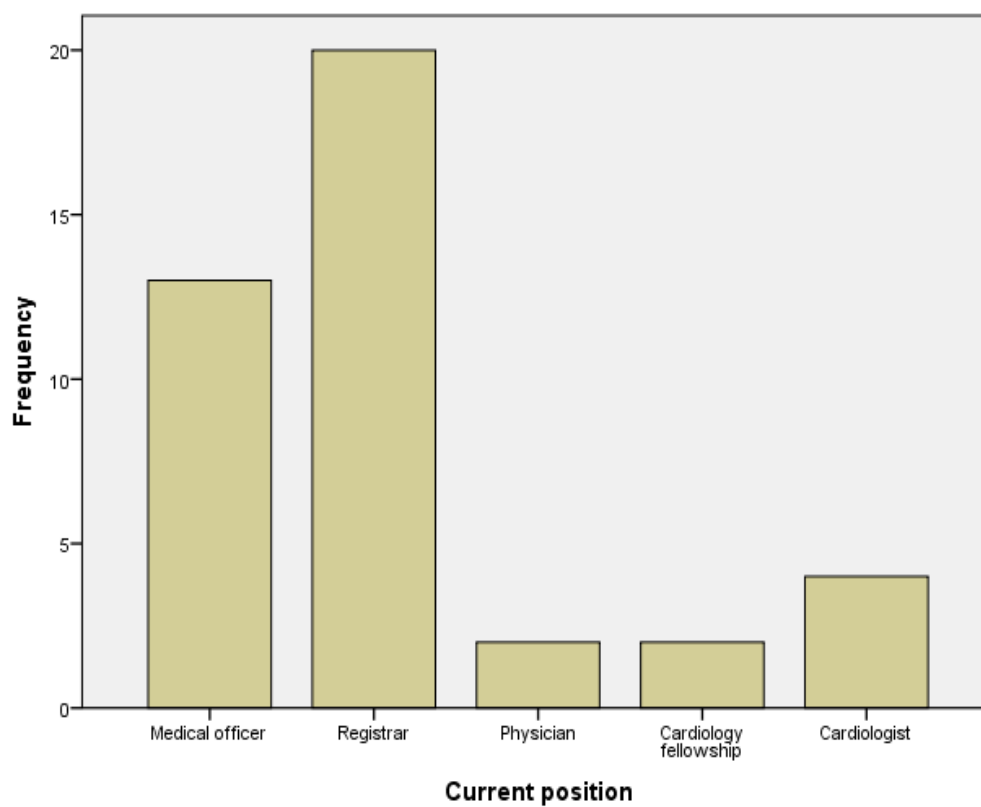
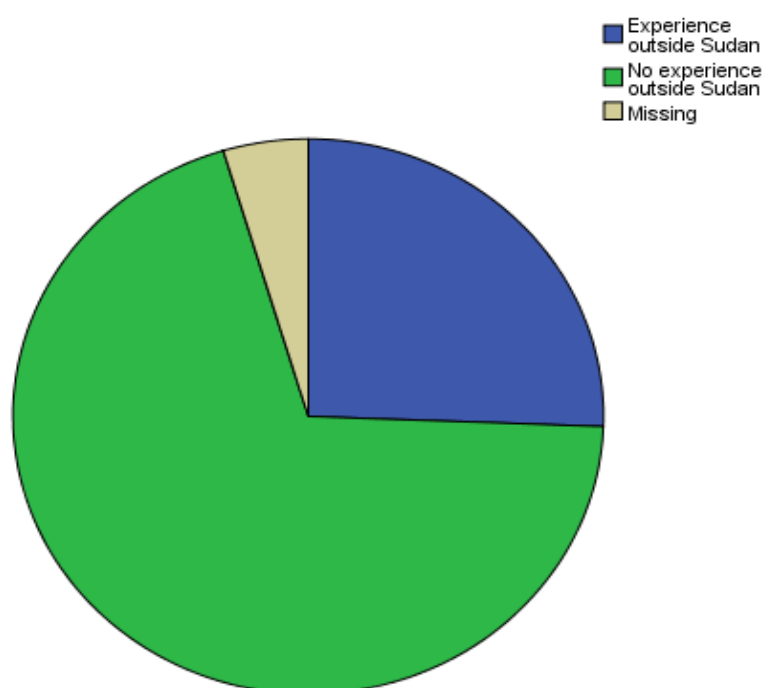
The participants were doctors at different levels in their medical career with experience in cardiology ranging from one year to 23 years (Median = 5). Because cardiology is considered as a sub speciality, the most junior doctors available were the medical officers; these had at least two to three years of post-graduate medical practice. Doctors with increasing seniority were, the registrars, the physicians, the cardiology fellows who were

training to be consultant cardiologists and the top senior cardiology consultants. A description of the participants' characteristics is shown in Table 6.3. An illustration of these characteristics is also shown in Figures 6.1 and 6.2. Two of the respondents did not provide any information about their background. Most of the respondents (49% (20)) were registrars. These had varying years of medical practice ranging from three to eleven years and most of them (73% (30)) had no work experience outside Sudan. The majority of the respondents (71% (29)) were male doctors. None of the female prescribers had experience outside Sudan. Although male doctors were the dominant gender in this study, a report in 2012 has shown that there is almost an equilibrium between females and males working in healthcare in Sudan (Government of Sudan, 2012). Although the report includes all healthcare workers, the increase in female health workers was partly attributed to the increase in the number of females joining medical schools in Sudan.

Table 6.3 Characteristics of survey participants (prescribers) (N=41)

<i>PARTICIPANTS'</i> <i>CHARACTERISTICS</i>	<i>FREQUENCY (%) OF</i> <i>PRESCRIBERS</i>	<i>NUMBER OF PRESCRIBERS</i>
Gender		
Male	71	29
Female	29	12
Job Title		
Medical Officer	32	13
Registrar	49	20
Physician	5	2
Cardiology Fellows*	5	2
Consultant Cardiologist	10	4
Work experience		
Experience outside Sudan	27	11
No experience outside Sudan	73	30

*Cardiology Fellows: physicians on training to become cardiologists

Fig 6.1 Job description of survey respondents (N=41)**Fig 6.2 Prescribers' work experience**

6.4.1 Sources of information

In the first part of the survey prescribers were asked about the sources of information that assisted them in prescribing. The majority of the prescribers (97%, (42)) were in agreement that clinical guidelines were used as a source of information to direct their prescribing. In addition 69% (29) of prescribers identified the hospital pharmacist as a source of information (Table 6.4).

Table 6.4 Sources of information used by prescribers (N=43)

	STRONGLY AGREE % (N)	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	STRONGLY DISAGREE
Senior colleagues	28(12)	58(25)	9(4)	5(2)	-
Other colleagues	2(1)	58(24)	19(8)	12(5)	7(3)
Medical textbooks	51(22)	35(15)	5(2)	5(2)	5(2)
Journals	17(7)	39(16)	17(7)	22(9)	5(2)
Drug company Representative	9(4)	37(16)	30(13)	19(8)	5(2)
Community Pharmacist	2(1)	41(17)	22(9)	29(12)	4(2)
Internet	21(9)	50(21)	17(7)	9(4)	2(1)
Conferences	26(1)	55(23)	12(5)	2(1)	5(2)
Hospital pharmacists	17(7)	52(22)	19(8)	7(3)	5(2)
Hospital formulary	8(3)	64(25)	18(7)	8(3)	3(1)
Clinical guidelines	53(23)	44(19)	-	-	2(1)

6.4.2 Factors affecting prescribing

Prescribers were asked about their views with regard to different factors that can affect prescribing as shown in Table 6.5.

Table 6.5 Factors affecting prescribing (N=43)

	STRONGLY AGREE%(N)	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	STRONGLY DISAGREE
Availability of drugs	65(28)	33(14)	-	-	2 (1)
Patient choice	5(2)	21(9)	35(15)	26(11)	14(6)
Patient education	14(6)	37(16)	14(6)	28(12)	7(3)
Drug related effects	53(23)	42(18)	5(2)	-	-
Drug frequency	28(12)	46(20)	16(7)	9(4)	-
Patient medical condition	70(30)	21(9)	2(1)	5(2)	2(1)
Information from the medical representative	9(4)	51(22)	28(12)	7(3)	5(2)
Follow up of patients	35(15)	49(21)	7(3)	5(2)	2(1)
Information from colleagues	12(5)	46(20)	26(11)	12(5)	5(2)
Drug monitoring	21(9)	37(16)	30(13)	7(3)	5(2)
Name of drug company	9 (4)	44(19)	23(10)	14(6)	9(4)
Drug cost	56(24)	39(17)	2(1)	-	2(1)
Guidelines	65(28)	30(13)	-	-	2(1)
Working place(government or private)	14(6)	44(19)	23(10)	12(5)	5(2)
Personal experience	26(11)	44(19)	14(6)	14(6)	2(1)

Most of the prescribers 'agreed' or 'strongly agreed' that the availability of drugs (98% (42)), the use of guidelines (95% (41)), drug cost (95%, (41)), drug related effects (95% (41)) and the patient medical condition (91% (39)) affected their prescribing.

In a different question when prescribers were asked to identify in order of importance the factors that affected their choice of drug, they prioritized guidelines, availability of drugs and patient medical conditions over cost and drug related effects when selecting which drug to prescribe.

From the previous interviews prescribers identified several issues with regard to prescribing drugs produced by certain generic companies. In the survey, prescribers were asked about the effectiveness of generic drugs and if the high cost of a drug implies better effectiveness. Twenty-two prescribers (52%) considered that the effectiveness of a generic drug is comparable to the 'brand' drug, while 13 prescribers (30%) were in disagreement with the above statement. With regard to the link between the high cost of a drug and its effectiveness, 43% (18) of the prescribers were not in agreement that the high cost of a drug is a measure of the drug effectiveness while 13 (31%) of them considered more expensive drugs to be effective.

6.4.3 Use of guidelines in prescribing

Prescribers were presented with a set of statements about the use of guidelines in prescribing in Sudan, the availability of national guidelines in cardiology, the use of international guidelines by prescribers and the relationship between depending on guidelines versus experience as shown in Table 6.6.

More than half of the prescribers (57% (24)) indicated that clinical guidelines could be implemented in practice in Sudan. Although there was a major agreement (86% (36)) that guidelines are to be made for targeted population, 79% (34) of the prescribers considered that it is possible to

apply the international guidelines to Sudanese patients. On the other hand, while 56% (24) of prescribers were in agreement that following clinical guidelines is more important than following personal experience, 40% (17) considered the opposite to be true and that following personal experience comes first.

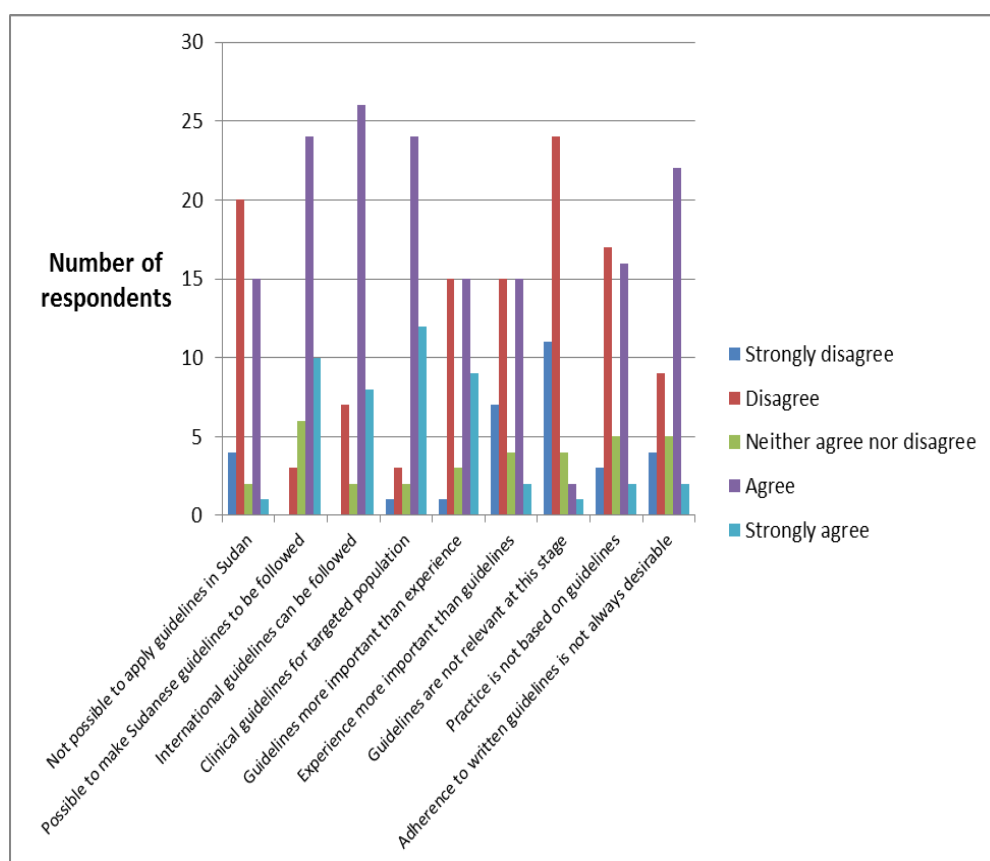
Table 6.6 Use of guidelines in prescribing (N=43)

	STRONGLY DISAGREE (%) N	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
It is not possible to apply treatment guidelines in practice in Sudan	9(4)	48(20)	5(2)	36(15)	2(1)
It could be possible to make guidelines for cardiology in Sudan	-	7(3)	14(6)	56(24)	23(10)
International guidelines for cardiology can be followed in Sudan	-	16(7)	5(2)	60(26)	19(8)
Clinical guidelines are to be made for targeted population	2(1)	7(3)	5(2)	57(24)	29(12)
Clinical guidelines are more important than clinical experience	2(1)	35(15)	7(3)	35(15)	21(9)
Clinical experience is more important than guidelines	16(7)	35(15)	9(4)	35(15)	5(2)
Clinical guidelines are not relevant at this stage of my practice	26(11)	56(24)	9(4)	5(2)	2(1)
Practice in Sudan is not based on guidelines	7(3)	39(17)	12(5)	37(16)	5(2)
Adherence to guidelines is not always desirable	9(4)	21(9)	12(5)	52(22)	5(2)

In a different question about how often they apply guidelines, the majority of the prescribers (72% (31)) considered themselves as 'often' or

'very often' applying guidelines when prescribing. However, when the prescribers were presented with the statement that the practice in Sudan does not follow guidelines, 42 % (18) considered that to be true while about 46% (20%) perceived the practice to be following guidelines. When prescribers were asked about adhering to guidelines in all circumstances, 57% (24) of prescribers perceived that following guidelines in all situations is not desirable while 30% (13) were in disagreement with the former perception. The prescribers' responses with regard to the use of guidelines in practice are illustrated in Fig 6.3.

Fig 6.3 Use of clinical guidelines in cardiology in hospitals in Khartoum



Prescribers were then asked to identify the guidelines that they were following, 13 doctors (32%) did not mention any, while the rest of the prescribers described NICE guidelines (37%(15)), published in the UK, American (17%(7)) or European guidelines (5%(2)) as their first preferred guidelines. Some of the prescribers (23% (9)) considered their practice to draw upon a combination of international guidelines. Few prescribers (5% (2)) referred to some medical websites which were considered to provide up to date guidelines recommendation, for example, Uptodate website.

In the interviews with senior prescribers, almost half of the prescribers indicated that there were national guidelines in Sudan and these were the guidelines for hypertension treatment. In the survey, when the doctors were asked about the availability of Sudanese guidelines, almost half of the participants (51% (22)) were not sure if such guidelines existed while 35% (15) thought that there were no Sudanese guidelines in cardiology. Only 14% (6) of the prescribers knew about the availability of the Sudanese Guidelines for Hypertension.

The reliability test (α) for the set of questions about guidelines use (9 items) was 0.5. No higher values than 0.5 could be obtained by deleting any items from the scale. As discussed in section 4.9.3, higher values of alpha indicates good consistency between the statements but lower values of α were used sometimes to indicate acceptable consistency (Bryman, 2012).

Association between variables and comparison between the groups

The next part of the analysis of the prescribers' response to guidelines use in Sudan is looking into possible relationships between some of the demographic background of the respondents and the range of their views captured in the questionnaire. Using Kendall tau-b test, some statistically significant relationships were found between the prescribers' current

position and their views with regard to the use of guidelines (Table 6.7). There was a more positive response to some of the statements about guidelines use as doctors became more senior in their job title. For the statements 'Experience more important than guidelines', and 'Guidelines not relevant at this stage of my practice' the scale were reversed, that is the highest scores were given for the 'strongly disagree' answer. Therefore, a positive value for 'tau' indicates that the more senior the doctors, the more negative attitude to these statements. Because of the number of statements that was tested against the different grades of prescribers, Bonferoni adjustment was applied to test the effect of lowering the significant 'p value' on the results as a measure of adjustment for Type 1 error (section 4.9.3).

Table 6.7 Correlation between prescribers' job title and statements about guidelines use

			Possible to make Sudanese guidelines	Guidelines more important than experience	Experience more important than guidelines	Guidelines not relevant at this stage of my practice
Kendall tau-b	Current position (Job title)	Correlation coefficient	0.296	0.450	0.448	0.396
		Sig 2-tailed	0.034*	0.001**	0.001**	0.005*
		N	41	41	41	41

* Correlation is significant at the 0.05 level

** Correlation is significant at the 0.01 level (applying Bonferoni's test)

Using the Mann-Whitney test, some statistically significant differences were found between the two groups of prescribers who had, or had no experience outside Sudan, male and female prescribers and their views with regard to guidelines (Table 6.8). After reversing the score on the

scale for negative statements, prescribers with work experience outside Sudan were more likely to have a negative response to the statement 'Guidelines not relevant at this stage of my practice' ($U = 99$, $p = 0.028$). With regard to gender, male doctors were more likely to agree to the statement 'Guidelines more important than experience' than female doctors ($U = 98$, $p = 0.021$) and female doctors were more likely to agree than male doctors that adherence to written guidelines is not always desirable ($U = 98$, $p = 0.024$).

Table 6.8 Mann Whitney Test for prescribers' views about guidelines use

Statement*	Guidelines not relevant at this stage of my practice	Statement**	Guidelines important than experience	Adherence to written guidelines is not always desirable
Mann-Whitney U	99.000	Mann-Whitney U	98.000	98.000
Sig 2-tailed	0.028	Sig 2-tailed	0.021	0.024
Median*** response	Experience 5 No experience 4	Median*** response	Female 2 Male 4	Female 2 Male 3

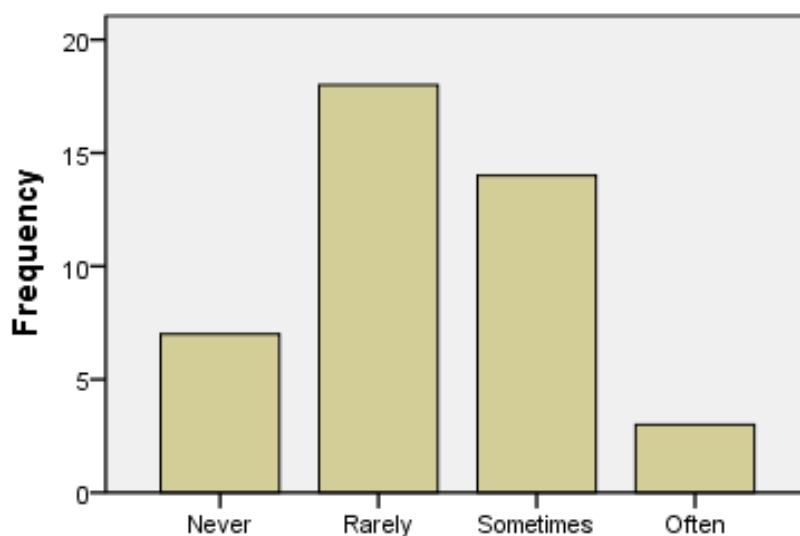
* Grouping variable: Experience
or no experience outside Sudan

** Grouping variable: Male or female

*** Median: 5-point Likert scale

6.4.4 Role of the hospital clinical pharmacists

The final part of the questionnaire explored the prescribers' perceptions of the current role of clinical pharmacists in the hospital. Prescribers were first asked if they were in contact with pharmacists in the hospitals; the majority, 58% (25) of prescribers said that they were 'rarely' or 'never' in contact with pharmacists in the hospital (Fig 6.5). The majority of prescribers indicated that the place where they were most likely to meet the pharmacists is the pharmacy.

Fig 6.4 Prescribers perceived contact with pharmacist (N= 43)

Prescribers were asked about what they thought clinical pharmacists were currently doing in their hospitals. Three prescribers did not answer the set of questions and commented that they were not aware of any role of the clinical pharmacist in their hospitals.

The pharmacist's role that the majority of prescribers (76%, (30)) expected hospital pharmacists to be doing was dispensing medication. However, there was more agreement than disagreement from the prescribers with most of the roles identified for hospital pharmacists such as pharmacists identifying prescription errors (66% (25)), drug related problems (56% (22)) and providing drug related information (53% (21)) (Table 6.9).

Table 6.9 Prescribers' views about the role of the hospital clinical pharmacist (N=40)

	STRONGLY DISAGREE %(N)	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
Dispense medications	-	5(2)	18 (7)	61(24)	15(6)
Educate patients about their medicines	15(6)	30(12)	7(3)	40(16)	7(3)
Identify drug related problems	10(4)	26(10)	5(2)	46(18)	10(4)
Assist the prescriber in recommending prescribed medication	10(4)	26(10)	18(7)	41(16)	5(2)
Detecting prescription errors	5(2)	18(7)	10(4)	53(20)	13(5)
Inform prescribers about availability of drugs	5(2)	20(8)	20(8)	38(15)	15(6)
Inform prescribers about guidelines therapy	18(7)	26(10)	16(6)	32(12)	8(3)
Establish patient drug history	8(3)	39(14)	22(8)	19(7)	11(4)
Inform prescriber about cost effective treatment	8(3)	26(10)	15(6)	31(12)	20(8)
Provide drug related information	10(4)	20(8)	15(6)	38(15)	15(6)
Ensuring prescribers are providing optimum therapy	13(5)	26(10)	21(8)	29(11)	10(4)

The set of questions about pharmacists' role appear to have good internal consistency with an α value of 0.9. Therefore, the positiveness of the respondents' views towards the role of the pharmacist was measured (Table 6.10). The total item score for the 11 items of the 5-point Likert scale was calculated to give an overall scale for the degree of positiveness. The mean value for the total scale was 35.9 with a maximum score of 52 and a minimum score of 13.

Table 6.10 Positiveness score of prescribers' views towards the role of pharmacists (N=34)

	VALUE
Mean	35.8
Median (Inter quartile-range)	36
Standard Deviation	9.9
Maximum score	52
Minimum score	13

Associations between variables and comparison between the groups

Using the Mann–Whitney U test, no statistically significant differences in responses to the clinical pharmacists' role was found among the different groups of prescribers with or without experience outside Sudan, the doctors working in Ahmed-Gasim hospital and Alshaab hospital and the gender of the respondents.

Using Kendall tau-test, two significant correlations were found between the prescriber's job title and their responses towards the pharmacists' role of educating patients about their medicines ($\tau = -0.324$, $p = 0.023$, $p < 0.05$) and taking patients' drug histories ($\tau = -0.295$, $p = 0.049$, $p < 0.05$). No correlation was significant at 0.01 level (applying Bonferoni's test). The negative correlation coefficient (τ) implies a negative relationship between the positive perception for these roles of the pharmacists and the higher the doctor's job title. Thus the less senior doctors were more likely to be receptive to these pharmacists' roles.

In a different attempt to investigate differences in responses between the groups, the prescribers' were divided into senior (cardiologists and physicians) and junior doctors (registrar and medical officers) based on their job titles. Some statistically significant differences were found between the two groups with junior doctors more likely to have positive responses with regard to pharmacists educating patients about their medicines ($U = 37.000$, $p = 0.019$), pharmacists identifying drug related problems ($U = 23.000$, $p = 0.003$) and pharmacists informing prescribers about guidelines therapy ($U = 39.500$, $p = 0.035$) (Table 6.11).

Table 6.11: Mann-Whitney Test for prescribers' views about the pharmacist role

Statement*	Educate patients about their medicines	Identifying drug related problems	Informing doctors about guidelines therapy
Mann-Whitney -U	37	23	39
Sig.(2-tailed)	0.019	0.003	0.035
Median**	Senior 1.5 Junior 4	Senior 2 Junior 4	Senior 1.5 Junior 3

*Grouping variable: Senior versus junior doctors

** Median: 5-point Likert scale

Summary of the results:

- More than half of the prescribers considered that clinical guidelines could be implemented in Sudan
- The majority of prescribers considered that international guidelines can be followed in Sudan
- The majority of prescribers perceived themselves as using guidelines when prescribing
- Some statistically significant differences between the prescribers who had, or had no experience outside Sudan and male and female prescribers and their views with regard to guidelines' use
- Senior prescribers were more likely to have positive attitude about guidelines use than junior prescribers
- There was a general positive attitude from the prescribers towards the roles of the hospital clinical pharmacist
- Junior prescribers were more likely to have positive responses towards some of the roles of clinical pharmacists than senior prescribers

6.5 Discussion

This phase of the research explored the prevalence of the views of the prescribers in the two hospitals on a range of issues related to the use of guidelines and the role of clinical pharmacists. Before asking the prescribers about the use of guidelines and the contribution of the clinical pharmacist, it was considered of interest to first examine the resources used by prescribers to assist in prescribing. Almost all of the prescribers in the cardiology hospitals (97% (42)) identified clinical guidelines as one of the most used sources of information for prescribing. Since the majority of the respondents were junior doctors and not consultants, a large number of them (86% (37)) also relied on senior colleagues experience as a source of information. Although more than half of the prescribers (69% (29)) considered hospital pharmacists as a source of information, 58% (25) of prescribers reported their contact with hospital pharmacists to be rare or not existing. This result may appear conflicting but can be explained as a positive perception from prescribers in considering that hospital pharmacists are a source of information that can assist with prescribing but that contact with this source of information occurred rarely.

Although prescribers may not always consider themselves as affected by the information provided by the drug company, (46% (20)) of the participant doctors in Sudan considered the drug company medical representative, who in Sudan is usually a pharmacist, as a source of information. The argument against the companies' representatives is that the information provided is usually biased and they are not considered as a preferred source of information for doctors (Oshikoya et al., 2011). Prescribers may argue that as long as the prescriber considers the potential bias coming from the company representative, it makes no harm in using drug companies' representatives to identify new drugs or make use of the company resources for the benefit of the healthcare system especially in countries with limited resources like Sudan. However, some earlier studies identified that prescribers consciously or subconsciously

get affected in their prescribing by information from commercial sources (Avorn et al., 1982).

The survey findings also showed some of the factors that affected the doctors' decisions when prescribing drugs for their patients that were similar to the results obtained from the interviews in chapter 5. The major factors affecting prescribing decisions were; information from guidelines, affordability of the medication to the patient and the availability of the drug prescribed in the market. Availability of medication achieved the highest response amongst prescribers in affecting their choice of medication. Although the majority of the drugs used in cardiology are registered in Sudan, some drugs are still not registered. Drugs need to be registered by the pharmaceutical authorities in Sudan before they can be imported or manufactured locally. One of the major problems is that the drugs which are registered in the country, the majority of which are imported, are many times not available in pharmacies because of a shortage of supply. Increasing local drug manufacturing may be considered as a possible way to improve the situation. However, and although there are a number of pharmaceutical industries in Sudan, there are similar obstacles in manufacturing including the availability of the raw ingredients which are usually imported.

With regard to the use of guidelines in prescribing, most of the prescribers considered themselves to be using guidelines when prescribing. A large number of the participants (72% (31) described themselves as using guidelines when prescribing but at the same time more than half of the prescribers (57% (24) thought that there were situations where adhering to guidelines would not be the best option. Although the vast majority of prescribers affirmed that they were using guidelines, the prescribers were divided in their opinions in considering whether the current practice in hospitals is following guidelines or not. It may be that following guidelines is a personal decision taken by doctors in the hospitals and that is why they decide on which guidelines they want

to follow. However, they could not see that implementation of guidelines is a practice endorsed by their hospitals.

The prescribers in the survey had many similar opinions to their senior prescribers who were previously interviewed (Chapter 5). The majority considered that it is possible to apply guidelines in hospitals in Sudan and that international guidelines can be used in Sudan. However, there was always a small number of doctors who were still sceptical about the possibility of applying guidelines in Sudan healthcare system (section 5.5).

Similar to the interviewed senior prescribers, there were more prescribers in the survey prioritizing guidelines over experience (56% (24) than experience over guidelines (40% (17)). The more senior the prescribers the more positive was their response in prioritizing guidelines over experience. Furthermore, prescribers with work experience outside Sudan were more likely to agree to the importance of guidelines to their practice. This can be linked to the more senior prescribers as they are the ones expected to have had training outside Sudan. Although some studies have shown that junior prescribers use guidelines more than senior prescribers (Choudhry et al., 2005, Higgins and Tully, 2005), junior prescribers can also use the experience of their senior colleagues as was shown in this study where prescribers referred to senior colleagues as a factor affecting prescribing. The argument concerning following guidelines versus personal experience especially with regard to the prescriber's years of clinical practice was previously discussed in section 5.5.

Most prescribers considered that hospital clinical pharmacists were doing most of the activities described in the questionnaire. The role of the pharmacist which almost all prescribers agreed on was dispensing medication (76% (30)), and for a large number of prescribers, detecting prescription errors (66% (25)). This is similar to the findings from the interviews conducted earlier where prescribers were more positive about pharmacists identifying drug interactions and side effects but more sceptical about pharmacists prescribing (section 5.5). The doctors' views

in Sudan were similar to the perceptions of doctors in other countries where clinical pharmacy in hospitals is a new concept, for example in Jordan and Kuwait, where prescribers were positive towards pharmacists involvement in patient care with more reception to roles like providing education to patients about their medications and detecting prescription errors (Matowe et al., 2006, Tahaine et al., 2009). Similarly in countries such as the United States where clinical pharmacy is now very developed, there was earlier scepticism from prescribers about advanced roles for the pharmacist and more support for traditional roles (Nelson et al., 1978b, Ritchey and Raney, 1981, Smith et al., 2002). Prescribers were not sure what to expect from the pharmacist outside the traditional roles usually linked with being in the dispensary. However, the clinical pharmacists in these countries managed to overcome such negative attitudes and pushed forward the clinical pharmacy practice. The new clinical pharmacists in Sudan are thus faced with a great challenge to show what more they can do with regard to their contribution to patient care in hospitals. The challenges facing the clinical pharmacists in Sudan will be further discussed in the chapters 7 and 8.

Some significant relationships were found between the prescribers' perceptions about the role of clinical pharmacists and the prescribers' current stage in their medical career. The less senior the prescribers, the more likely that they were positive about these pharmacists' roles. This is similar to other findings that showed that junior doctors were more positive towards advanced roles for clinical pharmacists than senior doctors (Smith et al., 2002).

There was no major difference in contact between the prescribers and the pharmacists between the two hospitals. This is in contrast to the interviews conducted with the consultants in the first part of this study where the consultants in Ahmed-Gasim hospital were more in contact with the clinical pharmacists than in Alshaab hospital. Considering that the majority who answered the questionnaire were the junior prescribers, the consultants, contrary to the juniors, were the ones who are based in the

hospitals and hence might have become more aware of the new role of the clinical pharmacists than the juniors. It can be hypothesized that the prescribers' comments with regard to the role of the pharmacist were prescribers' general perceptions rather than perception from actual experience considering that the majority were rarely in contact with the pharmacists. As mentioned earlier in section 5.5, this lack of contact between doctors and pharmacists was also observed in a previous study conducted in Khartoum hospitals (Awad, 2007). In contrast to the previous study, this study was conducted after the introduction of clinical pharmacists into the hospitals, so the expectation was that the situation might have changed. However, the number of clinical pharmacists is still very low compared to the number of doctors, so, it may be reasonable for a larger number of doctors in the hospitals not to have yet encountered clinical pharmacists.

6.6 Limitations and strengths of the survey

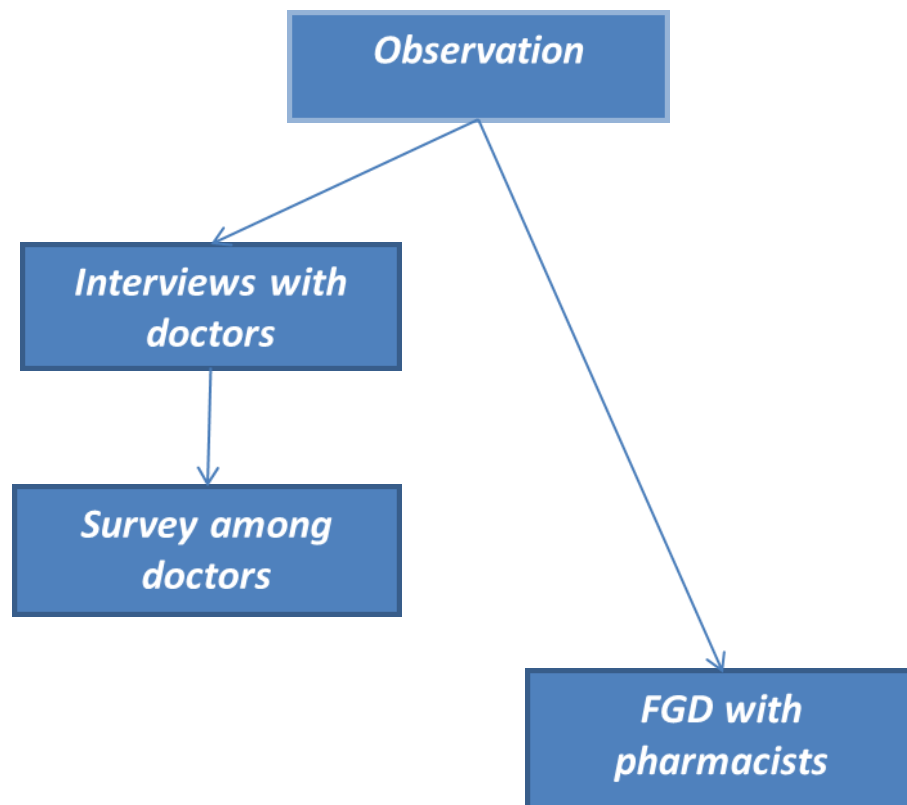
Although surveys are the most widely used instrument in research to obtain information especially from a larger population, it is acknowledged that in surveys there will always be the issue of whether the responses given are the real views of the respondents with regard to the topic. The respondents may be inclined to provide the most desirable answer rather than their actual practice (Bowling, 2009b, Bryman, 2012). This was minimized in this study by how the questions were worded and how the same concept was tapped into using different questions. In spite of this, the risk of bias from self-reports cannot be ruled out. Some reports examining physicians' attitudes towards prescribing identified the potential bias in the physicians' answers towards desirable answers than the actual practice (Avorn et al., 1982). For example, in this study some prescribers may have been inclined to give positive attitudes towards guidelines use as these were perceived as the most desirable responses.

In addition misinterpretations of the questions especially when the language used in the questionnaire was not the first language of the participants can be a limitation. Although most doctors in Sudan are expected to have a reasonable understanding of the English language, the possibility that the respondents may not have fully understood all the questions cannot be ruled out.

Furthermore, due to the relatively small number of participants in the study, some of the statistical tests were not feasible to undertake that is either the test was not possible to be carried out (for example, factor analysis) or no significant results were obtained (for example, some correlation tests).

Finally, it is difficult to estimate the effect of response or non-response bias on the study. Those who have responded may be biased in the information that they provided. In addition, those who did not respond may have different opinions from those who responded (Crombie, 1996, Smith, 2002a). As mentioned above, most of the senior consultants did not respond to the questionnaire; these seniors may have different views from the other prescribers. However, the majority of these consultants were previously interviewed. This was taken into consideration by linking the results obtained from the interviews with the results from the survey as described in the previous discussion.

CHAPTER 7 FOCUS GROUP DISCUSSION (FGD) WITH CLINICAL PHARMACISTS



7.1 Introduction

After examining the views of the prescribers in the two cardiology hospitals with regard to the use of guidelines and clinical pharmacy practice, the next part of the research, chapters 7 and 8, is going to explore the views of the clinical pharmacists of Sudan. This chapter specifically explores the views of the clinical pharmacists working in the two cardiology hospitals who took part in a FGD. The chapter presents the method used, the results obtained, a discussion of these results and the methodological limitations. Further discussion of the results linked with the results of the other chapters will continue in chapters 8 and 9.

7.2 Method

A focus group discussion (FGD) was conducted with the clinical pharmacists working in Alshaab and Ahmed-Gasim hospitals in Khartoum.

7.2.1 Sampling of participants

The pharmacists in this FGD were purposively selected to examine the new practice of clinical pharmacy in hospitals in Sudan. Therefore, the pharmacists chosen were those appointed as clinical pharmacists in the two hospitals. Unlike the other pharmacists working in these hospitals, these pharmacists obtained a post graduate degree in clinical pharmacy. Five clinical pharmacists were identified in both hospitals. Only two pharmacists, one in each hospital, were found to be assigned to cardiology wards. Therefore, due to the small number of first appointed clinical pharmacists, their points of view were considered to be of great value and hence all the five pharmacists were selected as the sample for one FGD.

The pharmacists were approached by the researcher during earlier visits to the hospitals to discuss the possibility of conducting the FGD. One pharmacist was not available as she was on a long leave from the hospital. Verbal willingness to participate in the FGD was given by the remaining four pharmacists. The venue was agreed by the pharmacists to be in Ahmed-Gasim hospital because of the availability of a separate office for the clinical pharmacists. A date was decided by the researcher and a phone message was sent to the pharmacists to check their availability on that date and their preferred time of the day to have the FGD.

7.2.2 Developing the FGD guide

The FGD guide was developed with the aim to explore the role of the clinical pharmacists in hospitals in Sudan and the obstacles encountered from these pharmacists' perspective (Appendix 7). The exploratory observation carried out at the beginning of the study contributed to the development of the FGD guide mainly with regard to the patient-pharmacist and the doctor-pharmacist relationships (section 4.12).

7.2.3 Conducting the FGD

Before conducting the FGD the researcher attended a focus group discussion in the University of Bath for training purposes. In Sudan, the pharmacists were given an information sheet about the research a few days before the FGD (Appendix 3). On the day of the FGD, the participants were ensured about issues of confidentiality and anonymity as explained in the information sheet handed earlier and were asked for a written consent for their participation in the study (Appendix 4). The pharmacists were also asked for permission to audio-tape the discussion. The discussion was facilitated by the researcher. An academic pharmacist with previous experience in conducting focus group discussions was

asked to be the co-facilitator for the group discussion (section 4.8.2.2). The co-facilitator listed the extent of participation of each member of the group using the seating arrangement. The co-facilitator was also asked to intervene if any problems were encountered with or during the running of the discussion.

All pharmacists were continuously encouraged to participate in the discussion. The less participating pharmacists were prompted using phrases like 'What do you think?' or 'Do you have a different experience?' Although there was a previously prepared topic guide it was difficult not to venture into new areas of discussion. The researcher was aware that the issues discussed and arising from the FGD should also be of importance to the participants (Smith, 2002a). Therefore, the pharmacists were given the chance to add questions or discuss certain issues among themselves.

7.3 Handling and Analysis of data

The amount of data from the FGD was regarded as quite considerable (about 33 pages). The researcher thus reduced the amount of data that was going to be coded. The data which was either directly relevant to the topic guide, the research questions or were considered of interest were identified and coded (Krueger and Casey, 2000). The coded conversation was then grouped under main themes which were either derived from the participants during discussion or from the topic guide. The analysis of the FGD was supported by the software N_vivo 9. The FGD was analysed by presenting a descriptive summary of the data followed by interpretation of the data in the discussion according to Krueger (1994) methods of analysis of FGD (section 4.9.2).

7.4 Results

Four pharmacists participated in the focus group discussion which took place in Ahmed–Gasim hospital in August 2012. Two of these pharmacists were appointed in their hospitals as cardiology pharmacists. For the other two pharmacists, one was covering neurology wards and the other was covering nephrology wards (section 4.10.1). The characteristics of the participating pharmacists are shown in Table 7.

Table 7 Characteristics of the pharmacists in the FGD

<i>PARTICIPANT CODE NAME</i>	<i>SEX</i>	<i>HOSPITAL</i>	<i>COUNTRY WHERE MASTERS IN CLINICAL PHARMACY WAS OBTAINED</i>	<i>YEARS OF PRACTICE AS CLINICAL PHARMACIST</i>
M	Female	Alshaab hospital (cardiology unit)	Sudan	2
N	Female	Ahmed-Gasim hospital (cardiology unit)	Sudan	5
S	Female	Alshaab hospital (neurology unit)	Sudan	4
MS	Male	Ahmed-Gasim hospital (renal unit)	Malaysia	4

The focus group discussion took about one hour and a half with few interruptions as it was carried out in a pharmacy office. Some members of the group dominated the discussion more than others. The pharmacists took this opportunity to bring their own concerns to share them with other colleagues, for example, the problems they were facing at work and how to deal with them. The discussion was recorded and then transcribed verbatim. The discussion was carried out mainly in the Arabic language so after transcribing, it was translated into the English language. The main themes identified from the analysis were:

-
- Clinical pharmacist role
 - Clinical pharmacy course
 - Obstacles encountered
 - Achievements

The participants' quotes shown below were chosen in a way so that they can describe different types of responses obtained from the participants with regard to the topics discussed as well as showing some of the interaction between the group members that occurred during the discussion. Reporting the interaction between the group is considered what differentiates interviews from FGDs (Krueger, 1994). Because the quotes were translated from the Arabic language, there was a need to change some of the wording so that the text can be understandable in the English language. The reference for each quote will be the pharmacist code from Table 7 as well as the line number from the transcribed focus group discussion in N-vivo from which the quote was extracted, for example M, 126.

7.4.1 The role of the clinical pharmacist

All the pharmacists involved in the discussion have been working in their hospitals before taking their post graduate degree in clinical pharmacy. However, they were only appointed as clinical pharmacists when they obtained their post graduate degree in clinical pharmacy. Before that, they were based in the dispensary or doing other pharmacy-related office jobs. There was no obligation for them to be on the wards, although one of the pharmacists put some personal effort to attend ward rounds. After completing their clinical pharmacy qualification, the pharmacists became available on the wards and considered themselves to be more in contact with other healthcare professionals.

“A change has occurred to our job. Before, we didn't have any contact with the wards or the doctors. After the clinical [course] we started going to ward rounds, having contact with the patient or patient medical file [...] and

with the doctors if they have any questions [...], this is the change that has happened. Before, the whole day was in the pharmacy, you come in the morning you go to the pharmacy and then you leave the pharmacy to go home, even the people of the hospital had no contact with us.”(M, 126)

“No pharmacists’ interventions [on ward level] before, and it was not compulsory, however, we tried to have at least one pharmacist in the ward round but we didn’t manage to keep this as the work load in the dispensary was too much with the number of staff available. There was not anything obligatory that made me or any pharmacist leave my work in the dispensary and go to a ward round. It was just a personal effort.”(N, 140)

The different roles that these pharmacists undertook after obtaining their clinical pharmacy qualification could be summarised under three main roles; ward visits, medicine information service and training/educational role.

Ward visits by pharmacists

As part of their clinical role, the pharmacists were doing ward visits and attending doctors’ ward rounds. The pharmacists tried to make their visits to the wards to coincide with attending the ward round. For the pharmacists in Ahmed-Gasim hospital there was a requirement to attend one ward round every week. This requirement, as explained later by the pharmacists, came from the State Directorate of Pharmacy in the State Ministry of Health which Ahmed-Gasim is part of (section 4.10.1). The pharmacists considered that for their interventions to be considered, they needed to be made in the presence of doctors during the ward rounds otherwise, their effort was not recognized.

“What is required is one ward round per week (M: interrupts “one round?”) for every clinical pharmacist so for the two of us two rounds, then people can add up but the minimum is one for every pharmacist [...] the main one to attend is the major round [a major round is the round where

the consultant with all the team are usually present], the rest of the rounds, nothing formal but whenever I find time I go to the wards, I look into the notes, if there is any drug problem, of course the consultant is not there but there is a medical officer in the ward or the sisters. The things that are to do with the nurses, I tell the nurses and the things that are to do with the medics I tell the medics. But I feel it is a lost effort.”(N, 1108)

“This is the advantage of the ward round, you listen to the discussion, you know why they prescribed what they prescribed [...] that is how I know what the doctors were thinking about and then I can go and find more [...] but really attending the round is very important.”(MS, 1746)

Medicine information (MI) service

One of the activities of the clinical pharmacists was the provision of a medicine information service. For the pharmacists in Alshaab hospital this service was available even before they were qualified as clinical pharmacists. The service was run by other pharmacists some of whom had post graduate qualifications but not necessarily in clinical pharmacy. The pharmacists in the group disputed over whether the medicine information service should be provided by any pharmacist or only clinical pharmacists.

“I and MS [clinical pharmacist] are covering MI. In all state hospitals the clinical pharmacists are covering MI except one state hospital [...]. It is difficult to split MI from the clinical work so I think only clinical pharmacists should cover MI services.”(N, 1453)

“One of the tasks of clinical pharmacists is medicine information. We are based in the MI office so if somebody comes with a request we will deal with it.” (S, 1441)

“The doctors who have questions [...] they need a pharmacist based in MI to answer their questions, not necessarily a clinical pharmacist but any pharmacist.”(M, 1446)

Training/educational role of pharmacists

The clinical pharmacists in the two hospitals were involved in training of other pharmacists and undergraduate students who come to the hospitals. Currently, the graduate pharmacists of Sudan spend about three weeks in hospitals as part of their pre-registration training. Part of their training requires that they do ward visits. In addition, some of the newly established schools of pharmacy have introduced clinical pharmacy as part of their under graduate syllabus and some of these universities are sending their students for short training in hospitals.

“Undergraduate and graduate pharmacists, we do clinical work with both of them on the ward. We discuss with them the patient notes and show them what to do and then ask them to come and do a presentation.”(S, I376)

The pharmacists also started to be involved in doctors' training by organizing lectures about drug related topics and inviting the doctors to attend.

“The things that have changed for us are the weekly lectures that we now organize for the doctors working in the hospital. Before even if we had to organize drug information topics, it was only for the pharmacists, now we are organizing lectures for the doctors.” (M, I49)

7.4.2 Clinical pharmacy course

For the pharmacists to be appointed as clinical pharmacists they had to undertake a post graduate course in clinical pharmacy. Three of the pharmacists undertook the clinical pharmacy course run by the Faculty of Pharmacy, University of Khartoum, which was the first one of its type in the country. One of the pharmacists of Ahmed-Gasim hospital is from the first group that was graduated from this course. When the pharmacists were asked about how they knew what they needed to do in the hospitals as clinical pharmacists, they also agreed that the clinical pharmacy course

provided them with the introduction to their new role.

“The change was from the faculty [who run the course]. When we did the clinical pharmacy course we knew what we needed to do.”(M, 163)

“[...] from the course introduction and the syllabus, we became aware of what our role will be; in addition, the second year of the course was spent in Soba hospital which included being part of the rounds and the unit meetings.”(N, 173)

“I felt that there is a great difference, before we did not know, but after the course our thinking is bigger and broader, you can link things with each other.” (MS, 1352)

One of the pharmacists considered that personal effort, in addition to the course made her aware of what they needed to do differently as clinical pharmacists.

“The course was really the link between the pharmacist and the doctor and the pharmacist and the patient. Before we used to deal with the prescription only without even properly clinically considering what is written inside it, even reading the patient file we didn’t know [...] we didn’t know the abbreviations regarding patient history, so we really benefited, but there was also a personal effort.” (S, 1368)

The pharmacists considered certain areas in which the clinical pharmacy course in Khartoum was lacking. One of these areas was the amount of time allocated to practical work compared to theoretical work. The course was a two year course. The second year of the course was meant for practical work and this was done in Soba Teaching Hospital which is affiliated to the University of Khartoum. One of the pharmacists (MS) did his postgraduate clinical course which was a one year course in Malaysia and had different experiences from the others with regard to the limitations of their training.

“I think it [the course] was lacking in a way, it should have been more practical because most of what we had in lectures [the theory part] we already knew. It would have been better if it was more hospital based, medical cases discussion; we would have become stronger [in clinical work].” (M, I156)

“To some extent it was different, over there in Malaysia most of the time was in hospitals [...]. (MS, I234)

The pharmacists also shared the view that even the practical training in Soba Hospital had its limitations. For example, not having clinical pharmacists involved in the practical training was considered to be a setback in the course.

“Soba was one year but it lacks a lot of things [...] ((M) interrupts “Soba lacked in many ways”).” (N, I160, M, I161))

“The first thing is that we didn’t have a pharmacist with us.”(M, I162)

“We were lost because there was no clinical pharmacist there.”(N, I173)

The pharmacists had to accompany the doctors during their placement in the hospital. These doctors differed in their acceptance of the presence of the pharmacists and understanding of the requirements of their training.

“You just follow him [doctor], he used to ask me, ‘who are you?’ [...], ‘what do you want to do?’ [...] I felt that that I was lost [...].” (M, I188)

“At the same time there was a doctor in the unit who said I don’t want to see any pharmacist with me [...] he said nobody to touch the file, the pharmacist wanted to look into some information from the file, the doctor said no [...] but on the other hand there were some cooperating people.”(N, I206)

“There were consultants who very willingly accepted us and welcomed us; some of them were abroad so they know that there is clinical pharmacy.” (S, I179)

The pharmacists of Ahmed-Gasim hospital, identified that after the course they had some external support from the Ministry of Health to perform their role. The State Directorate of Pharmacy in the State Ministry of Health which Ahmed-Gasim hospital is part of, provided support for a time through meetings and advice to the clinical pharmacists in the state hospitals. The pharmacists of Alshaab hospital lacked this support.

“In addition to the course, after graduation there were monthly meetings in the State Ministry of Health about the things that need to be accomplished in our clinical work, including presentations, interventions and the feedback from doctors [...] every month people discuss what they did in their hospitals.”(N, I76)

“Obviously this is only in the state ministry, for us in the Federal Ministry of Health [Alshaab hospital], there is no authority that asks you what you did or what you are doing. You by yourself have to decide. May be things will change in the near future.”(M, I81)

During the FGD it was realized that the pharmacists' main efforts were with the doctors and other healthcare professionals. Although it is acknowledged that any intervention provided by the pharmacists will automatically have an impact on the patient, the pharmacists did not refer to their direct role with the patient. The pharmacists were therefore asked if they were in direct contact with patients.

“The main contact is with the doctors but I work shifts in the dispensary, there the contact is more with the patient, those outpatients are more in need [of pharmacists], the rest who are inpatients, the nurses are taking care of them [...], the nurse is responsible for the patient things [tablets].

Outside [the ward] the patients are carrying their own medicines', it is the outpatients that need education."(MS, I480)

The pharmacists were also asked if they can at least have contact with the patients when they are newly admitted to the wards.

"There is a problem with seeing new patients which is you don't know when they are admitted, unless you go regularly to the ward, seven days a week."(N, I492) (MS agreed).

During the observation it was noticed that there were no drug charts and doctors wrote drug histories on a sheet placed in the patient notes, so clinical pharmacists were asked about that and if they were involved in taking drug histories.

"I did try once to review the patient medication, if the medical officer had taken the right drug history, there is rarely a problem with a drug missed or it is not written in the right way." (N, I532)

"This is strange because in our hospital doctors do not write drug histories [...]." (M, I535)

The pharmacist was informed by the researcher based on preliminary observation that the doctors usually wrote drug histories on the admission chart but without it being clearly stated as drug history. It could easily be confused with medications prescribed on admission.

"Drug histories and patient counselling need somebody who has all the time just for the ward." (S, I496)

Some of the pharmacists started to consider providing direct services to the patients, some of which required doctors or managers' approval before they could be implemented.

“I did start to make something for the patient, like a patient medication card, I showed it to you [the researcher] but it didn’t come out, those who saw it they said it is nice, but at the end nothing happened.”(M, l476)

“Daily there is a warfarin clinic with a medical officer in charge [...] I may go and sit inside with the doctor and the dietician in most cases. I may stay inside the clinic or there are some patients that come to me [in the pharmacy office]. I talk to them about the drug, how to take it, I talk about the other drugs that they are using, the diet and try to correct some of the information they have.” (N, l996)

7.4.3 Obstacles encountered

The pharmacists discussed a number of obstacles facing them in their new clinical pharmacy role. The first of these were the doctors’ perceptions to their role. Some of the doctors were more receptive than others to the pharmacists’ role.

“The other thing is that although it has been four years since we started to be part of the ward rounds, the doctors don’t think that I should be part of that [ward round], that I should intervene and contribute to the treatment plan, as if all what I am doing is purely a voluntary work from my side, that is, an extra thing above of what is required from the pharmacist.” (N, l641)

“The doctors think that they know about drugs more than we do, I did realize this, they diagnose the disease and prescribe the treatment without thinking that the availability of a pharmacist in this process is of use [...] even the senior consultants.” (S, l651)

“I remember the first time that we were distributed over the three units (me, Neurology, NO, chest and M, cardiology), we went to Dr (T...) a neurologist, he did welcome us and said that it is a good idea to have clinical pharmacists and that what they do abroad.” (S, l655)

Not only doctors were not familiar with the clinical pharmacist's role but also other non-clinical pharmacists including direct managers were not providing enough support for the new clinical pharmacists.

"I have got something to say, the senior pharmacists because they are not clinically trained do not understand what we are doing, we put a lot of effort [to make them understand our role]."(S, l871)

'We did not find support; senior pharmacists should have taken us off other duties and made us only do this clinical work so that we can prove something. We found that the pharmacy managers want us to work in the dispensary, we found more support from the doctors than the pharmacists [...]. The chief pharmacist cannot see that he is making use of us, he thinks that we are not doing anything on the wards, he said if you want the money incentive [pharmacists usually get some extra payment on top of their salaries known as incentives] come and work with your other colleagues in the dispensary'. (M, l68)

The pharmacists also considered that the lack of easy access to information sources and absence of national protocols as hindering their practice. The pharmacists used the words protocols and guidelines interchangeably.

"Sorry you asked about the obstacles, there is another obstacle which is the availability of the information. If you need any information about something, you want a book, internet; we have to pay from our own money'."(M, l764)

"There are no national protocols/guidelines; this part of the doctor's experience has got a big role in therapy. What they prescribe may not be written anywhere and not evidence-based [...] if you intervene, the doctor may simply say that he/she has tried this before [...] so I don't have anything more to say because there isn't any national protocols that I can back myself with. Usually when there is a presentation [lecture attended

by pharmacists and doctors], some doctors will tell you that the international guidelines belongs to foreign countries, it does not apply to us, it is been written by Europeans and Americans, it does not apply to us, and there are no national protocols!"(N, 1634)

Although the clinical pharmacists were appointed as 'specialist' pharmacists, different to the other pharmacists in the hospital, they still thought that an agreed upon job description for a clinical pharmacist is not yet available.

"Also one of the obstacles which may be clear from the beginning, is that there is no job known as 'clinical pharmacist', no job description [...] see this job description [on the wall], there was a quality check by the Ministry of Health and they told us that every department in the hospital should have their job description on the wall, even the medical manager of the hospital was surprised when he saw it, he said 'where did you get this job description from?' We laughed and told him we took it from the internet because there is nothing yet called a clinical pharmacy job." (N, 1782)

Lack of enough clinical pharmacists in the hospitals also made it difficult for pharmacists to cover all patients as only one clinical pharmacist was appointed to each speciality.

"We have got six units; it is difficult to cover the six."(M, 1697)

"[...] to see all the patients every day this is extremely difficult."(N, 1703)

The pharmacists were concerned that their managers were not aware of their need of continuous training and although they gave them the chance to do the clinical pharmacy course, this was not enough and further training was required.

“We just started knowing how to practice clinical pharmacy, but there is no training, there is no two and three [after step number one].”(MS, 1827)

“If we continue to stay like this we will not develop. They cannot depend on the fact that you did the Master degree; that is it. This is just the beginning but you need to progress in your work.”(N, 1824)

7.4.4 Achievements

The pharmacists were given a chance at the end of the discussion to come up with any issues which they thought were of interest and if they liked them to be discussed. The pharmacist from Alshaab hospital with the least years of work experience as a clinical pharmacist put forward a question for the other pharmacists in Ahmed-Gasim hospital about what they thought they have managed to achieve in the last years.

“I need a research to measure the outcome [laugh]!” “But I can say that we are saving the patient/hospital some money because now we can provide the information, for example, we tell the patient or nurse that this particular drug can stay 72hrs in the fridge for reuse; this is money saving.”(MS1034, 1039)

“There are things, for example, Vancomycin they used to dilute it in any solution, the heparin was not properly monitored, we changed that.”(N, 11037)

“Nurses want to know about drugs, in the intensive care we did like a timetable [...], so I think education wise we are doing well but the clinical work, we are still [behind] [...]. The other thing is that the doctors started to acknowledge our presence, although some are not still very approving but they know now that we are going to be on the wards and work as clinical pharmacists.”(M, 1061)

Another issue which was brought up to the pharmacists of Ahmed-Gasim hospital was if they were able to convince their managers of the benefits of what they were doing.

“Benefits in hospitals and for managers is always considered from a financial perspective. For example, the doctor sees 40 patients a day and every patient admission ticket costs [...] so the doctor whether a consultant or a medical officer is the main important person [...], there is a problem in measuring the outcome, for ourselves and also for the managers.”(N, 1834)

Summary of the results:

- There was a change in the practice of the hospital pharmacists after they obtained their clinical pharmacy qualification.
- The post graduate clinical course of the University of Khartoum helped the pharmacists in their new role but was considered as lacking in some areas
- Clinical pharmacists were more concerned to attend ward rounds to get doctors' approval than spend time with the patients
- Clinical pharmacists faced a number of obstacles in their new role

7.5 Discussion

This part of the study explored the new role of clinical pharmacy through a FGD that was conducted with the first appointed clinical pharmacists in Alshaab and Ahmed-Gasim hospitals in Khartoum. The FGD explored the views of these pharmacists considering the training they had to prepare them for their new role, the changes that have happened in their practice since they became clinical pharmacists and the obstacles encountered in their new role.

The pharmacists felt that their hospital professional status has changed since they became clinical pharmacists. They have shifted from being the pharmacists who stayed the whole day in the dispensary without being

recognized outside the pharmacy to those on the ward who were in more contact with other healthcare professionals. The move of pharmacists in hospitals from the drug supply role towards clinical roles has been considered as an enhancement to the concept of professionalism in pharmacy (Hammer, 2000, Schafheutle et al., 2013). The pharmacists in the FGD perceived that a shift in their status has occurred even if their work is still not often recognized.

It is perceived by the researcher that the professional identity of pharmacists is a topic which has attracted a lot of discussion between pharmacists themselves, other healthcare professionals and even members of the public. The pharmacists may not have a single professional identity and it may be more suitable for pharmacists to describe themselves as having a number of roles (Elvey et al., 2013). For example, the pharmacists can be the drug advisors or the drug suppliers or both of these roles together. What is important is that these roles have a shared goal of ensuring that drugs are safely prescribed and used by patients. While the clinical pharmacists in this study considered that they needed to move from being part of the routine drug supply in the dispensary, it can be argued that it is an advantage to keep that 'safe supply' role in the dispensary in addition to the new bed-side clinical role. One of the pharmacists in the FGD perceived that the patients who come to the dispensary may be more in need of the pharmacist's counselling than the inpatients. From the researcher experience, clinical pharmacists working in hospitals in some other countries, for example UK, maintain their dispensary roles, even if it is minimal, in addition to their ward roles. The idea is that it is desirable for all pharmacists to maintain the dispensary skills of effective and safe supply of drugs and that any pharmacist clinical or not should be able to work effectively in the dispensary when required.

With regard to other duties of clinical pharmacists, there were different views among the participant pharmacists to whether or not the provision of medicine information services should only be performed by clinical pharmacists. The development of drug information centres in US in the early 1960s as a speciality service was considered to have given way to the movement in clinical pharmacy practice that took place in the late sixties (McLeod, 1976). Thus medicine information and clinical pharmacy have been linked together since earlier time as being speciality services for pharmacists. The current practice in many hospitals in countries like UK as experienced by the researcher is that medicine information service is usually a speciality service run by clinically medicine information trained pharmacists. The possible argument is that the medicine information pharmacist need to have the clinical knowledge in order to provide patient centred medical advice. However, in situations like Sudan where there are only few clinical pharmacists, a compromise may be the solution. Non-clinical pharmacists can provide medicine information services but under the supervision of a clinically trained pharmacist and in the best scenario medicine information trained-clinical pharmacist.

The pharmacists acknowledged that the post graduate course they undertook in clinical pharmacy provided a good start for their careers as clinical pharmacists. However, the clinical pharmacy course for those who completed the course in University of Khartoum was considered to be lacking in different ways. One of the main drawbacks from the pharmacists' point of view was that they did not find any senior clinical pharmacists to support and guide them in their training. The majority of the doctors in the hospitals were not very much aware of the training needs of these pharmacists. Broadhead (1985) discussed the importance of clinical training of pharmacists in providing not just the clinical knowledge required but to prepare pharmacists with all aspects of the professional role that they have to undertake as part of a multi-disciplinary healthcare team.

As the course in Khartoum is the first postgraduate course in Sudan to provide specialized training in clinical pharmacy, it was expected that it would be difficult to get pharmacists with clinical experience to do the training. In spite of the fact that the participants in the FGD have been hospital pharmacists before joining the course, this did not seem to make their training much easier. This was explained by the pharmacists in that their previous work was mainly within the dispensary and no commitment to any clinical work. In the early years of clinical pharmacy, those pharmacy graduates who were trained in hospitals, even without specialised clinical training, were the ones who led the pharmacy practice from the pharmacy to the ward (McLeod, 1976). It is presumably the expectation by many that these first clinical pharmacy graduates will be the ones to lead the way in clinical pharmacy practice in Sudan.

The clinical pharmacists' effort in seeking doctors' recognition for their services made them more concerned to be on the wards during ward rounds than any other time to make their interventions. This is similar to the findings of other studies in which clinical pharmacists perceived that in order for their clinical roles to be recognized they needed to be in continuous contact and interaction with doctors (Broadhead and Facchinetti, 1985, Weiss, 1994). However, this focus on getting doctors' attention made the pharmacists in this study less in contact with the patients on the wards. This idea of clinical pharmacists re-directing their attention from patients to doctors may be one of the reasons that clinical pharmacy during its development was once considered to be a service for doctors and not patients (Smith, 2007).

The effort from pharmacists to get doctors' recognition has raised two sides of an argument. The first one has been that once the prescribers are exposed to the pharmacists, for example on the wards, they will acknowledge the pharmacists' contribution (Nelson et al., 1978a, Ritchey and Raney, 1981). This has been considered as an advantage as prescribers have been the dominant profession in healthcare so their acceptance of the new role of the pharmacist is of importance

(Ritchey and Raney, 1981). The other argument has been that there is a lack of confidence from the pharmacists' side that makes them put a huge effort in seeking doctors' approval (Rosenthal, 2010, Hall et al., 2013, Hepler and Strand, 1990). In Sudan, in this study (section 5.5 and 6.5) and another previous study (Awad, 2007), doctors' seemed to be receptive and supportive to the involvement of hospital pharmacists in patient care. Some of the pharmacists in this FGD felt that some doctors were more willing than others to have pharmacists with them on the wards. Some of those supportive doctors had working experience outside Sudan and this was perceived by one of the pharmacists as the reason for the positive attitude. However, in the survey with the prescribers, there was no difference in response towards the role of hospital clinical pharmacists between those with or without working experience outside Sudan (section 6.4.4). It can be argued that the lack of support from some prescribers may not be due to prescribers not accepting pharmacists' involvement but more of prescribers not aware of what contribution pharmacists can make. This may not be surprising as not only in Sudan but in many countries recommending, prescribing and monitoring of drugs, even identifying side effects of drugs, have always been performed solely by the prescribers (Weiss, 1994).

The clinical pharmacists in Sudan are thus on a mission to professionally make their impact especially at the beginning of their clinical practice which requires joint work with the prescribers to present their unique skills in their area of expertise. The recognition of prescribers' to the positive effect of pharmacist in patient care may very well increase the pharmacists' confidence and lead the way to pharmacists accepting responsibility and accountability to patient care. Once this recognition is established the pharmacists may not have to put up with the issue of prescribers' approval and their presence will be a routine that is required in everyday patient care.

Relating the above to the interviews with the prescribers, doctors who were interviewed in Ahmed-Gasim hospital noticed the difference when a

clinical pharmacist was involved with them in solving drug-related problems (section 5.4). Thus the clinical pharmacist's effort in seeking doctors' recognition by being there on doctors' rounds may have proved worthy. This recognition even if by a small number of prescribers, can but only be considered as a positive step for these pharmacists and may well provide them with the drive to continue to improve their clinical services.

When the subject of achievements was brought up by one of the pharmacists, it was difficult for the pharmacists to exactly measure what they had achieved in the last years. For pharmacists in Ahmed-Gasim hospital the changes were more noticeable as it is a smaller hospital and the two clinical pharmacists in the hospital have jointly longer experience in clinical pharmacy. The only way that these achievements can be recognized is for pharmacists to document their interventions and carry out research into their practice. Research in the outcomes of clinical pharmacy service is known to be needed to obtain the evidence for the effectiveness of the service (Cooper, 1993).

The pharmacists had also identified several obstacles which were perceived as hindering their practice. These were, the absence of opportunities for further training, lack of resources of information, limited support from other healthcare professionals, lack of national protocols (or guidelines), no job description and not enough clinical pharmacists. In the first meeting of the Sudanese Society of Clinical Pharmacists which was attended by the researcher, a number of the society pharmacists discussed the obstacles that were facing them in the hospitals and hindering their work. These obstacles were more or less similar to what was identified in the focus group discussion including; the resistance by the prescribers to their role, the lack of information resources particularly national guidelines, not enough clinical pharmacists and lack of further training for those pharmacists who were already qualified. This can be an indication that many of the clinical pharmacists of Sudan are facing similar challenges in their new practice. These obstacles, in particular the issue of

non-availability of guidelines, with be further examined with a larger number of clinical pharmacists in chapter 8.

The clinical pharmacists of Sudan may be aware of the need of continuously developing their profession, however, they may lack the means of how to. The pharmacists will require their managers and healthcare system support for further training. However, the pharmacists have also to put some personal effort in order to develop and maintain the knowledge and skills training required so that they can gradually advance hospital clinical pharmacy practice in Sudan.

7.6 Limitations and strengths of the FGD

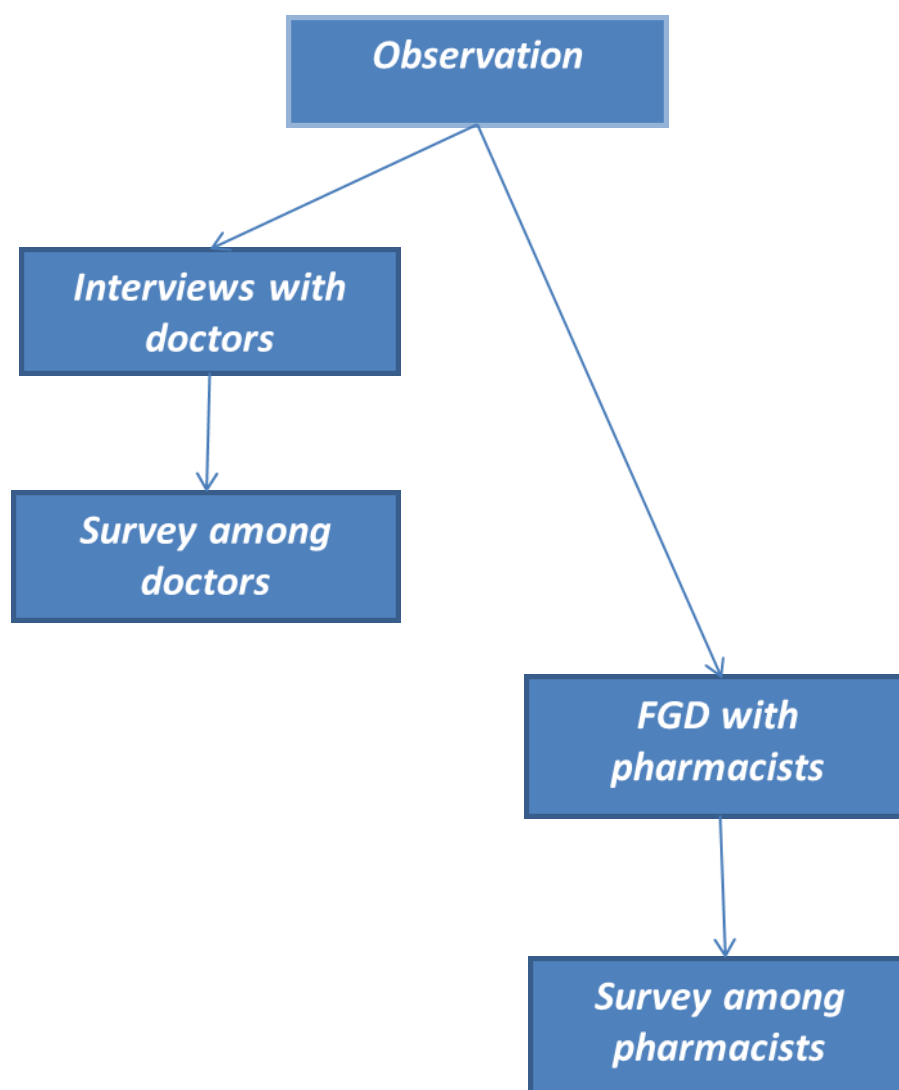
One of the ways the validity of a focus group is thought to be measured is by the extent to which the participants are able to present their views and have influence in directing the discussion (Smith, 2002a). The extent to which this was achieved with the pharmacists in this FGD is difficult to measure. However, pharmacists were ensured of the confidentiality of the information provided during the discussion. The researcher was also known to the pharmacists and this was hoped to have a positive effect on pharmacists in freely expressing their views. With regard to influencing the discussion, the pharmacists were given different opportunities to discuss the issues that were of concern to them. The pharmacists in the group found the FGD as a useful opportunity to discuss several issues regarding their work so that they could know what the other hospital is doing. Some of these issues were not considered directly related to the main discussion but the pharmacists were given the chance to discuss them. The researcher being a previous hospital clinical pharmacist was not able to detach from the discussion and also contributed by offering some advice regarding certain issues that were brought up by the pharmacists.

The group contained a variety of participants including the dominant participants and the shy participant. Although the researcher put an effort

into trying to fairly engage every participant in sharing their perceptions, the dominance of certain speakers was clear from the transcript and also from the flow chart diagram of how the conversation was going as drawn by the co-facilitator. This may have prevented the shy participants from fully presenting their views. As it was the researcher's first experience in conducting a FGD some opportunities may have been missed to obtain further information from the participants.

Finally, because of the small number of clinical pharmacists found in the two hospitals, it was only possible to conduct one focus group. This has led to the need to further examine the views of this small group among a larger population of clinical pharmacists in Sudan. Hence, a survey was conducted among some of the clinical pharmacists in Sudan as will be explained in chapter 8.

CHAPTER 8 ON-LINE SURVEY ON CLINICAL PHARMACY PRACTICE AMONG CLINICAL PHARMACISTS OF SUDAN



8.1 Introduction

This chapter discusses the online survey which was conducted among the clinical pharmacists of Sudan. The aim of the survey was to investigate the views of the clinical pharmacists with regard to their current role, the availability and use of guidelines in clinical practice and other obstacles facing clinical pharmacy in Sudan. The chapter presents, the method used, the results, a discussion of the results and the methodological strengths and limitations. Further discussion of the results will also be presented in the final chapter of this study.

8.2 Method

An online survey was used to collect data for this stage of the study. The questionnaire was designed using the University of Bristol Online Surveys website (BOS), a free online survey tool available through the University of Bath.

8.2.1 Sampling of participants

The population for the survey was the Sudanese pharmacists with a post graduate clinical pharmacy qualification. Getting contact details for the clinical pharmacists in Sudan was a challenge. A request was made to the Sudanese Society of Clinical Pharmacists (SSCP) to get contact details for the clinical pharmacists registered with the society. The SSCP was able to provide e-mail addresses as well as some telephone numbers. There were 172 e-mail addresses of clinical pharmacists provided by the society but only 109 pharmacists had phone numbers as well as email addresses. A similar request was also made to the University of Khartoum which was the first university in Sudan to start a postgraduate course in clinical pharmacy but the university did not keep any contact details. The SSCP later informed the researcher, after launching the survey that the list of clinical pharmacists provided was not only for the clinical pharmacists registered with the society but was for all the clinical pharmacists currently

registered with the Sudanese Medical Council (SMC). This is the body responsible for registering pharmacists and more recently, clinical pharmacists in Sudan. That meant that only a number of pharmacists who are registered as clinical pharmacists with the SMC joined the SSCP. The number of pharmacists who were actually registered with the SSCP was only 66 clinical pharmacists. All 172 email addresses were included in the survey.

8.2.2 Developing the questionnaire

The questionnaire comprised of an introductory section containing personal demographic information, followed by three sections covering the current role of the clinical pharmacist, the obstacles facing these pharmacists and the use of clinical guidelines in practice in Sudan (Appendix 8). These sections followed a 5- point Likert-scale design ranging from 'strongly agree' to 'strongly disagree'. The sections about the clinical pharmacist role and the use of guidelines were previously used in the survey conducted with the prescribers (section 6.2.2). These sections were slightly modified from the ones previously used to particularly target pharmacists rather than prescribers and the new role of clinical pharmacists in hospitals. In the second section of the questionnaire, a new set of statements were developed based on, the research objectives examining the challenges facing clinical pharmacists, drawing upon the pharmacists' views from the FGD and some of the literature about clinical pharmacy practice. The pharmacists were also given the opportunity in the questionnaire to add their comment on any relevant issues.

8.2.3 Piloting the questionnaire

The questionnaire was piloted in two stages. The first pilot was conducted at an early stage of the questionnaire design. Four pharmacists were contacted by e-mail asking them to participate in a pilot study. Two of

these pharmacists previously took part in the focus group discussion so their views with regard to the content of the questionnaire were considered to be of value. Only two pharmacists replied willing to take part in the pilot. One from the previous FGD and the other was a Sudanese pharmacist working in UK who was previously involved in some training activities with the pharmacists in Sudan. The pharmacists were asked to comment on the language used as the questionnaire was in the English language which is not the first language of the participants, the construct and content, ease of understanding and any other relevant issues with the questionnaire that might have been missed. In the second stage of the pilot, a similar check was performed for the final lay out of the questionnaire. This time the questionnaire was hand delivered to four clinical pharmacists who were active members in the Sudanese Society of Clinical Pharmacists (SSCP). The pharmacists' comments were positive about the questionnaire. There were few comments with regard to the ease of understanding of some of the questions which were taken into consideration and these questions were rewritten. In addition, one of the pharmacists in the first pilot tried to verify if it is intentional that some of the questions were asking about the same thing. The pharmacist was informed that this was intentional for the Likert-scale type of statements.

As this survey was using an online questionnaire, a final pilot for technical issues check was carried out by sending the questionnaire to the research supervisors in the University of Bath and the University of Helsinki before sending the questionnaire link to the participants.

8.2.4 Administering the questionnaire

An invitation e-mail was sent to the pharmacists asking them to participate in the online survey with the link to the survey attached. The e-mail provided details of how to contact the researcher if any of the participants experienced technical difficulties or preferred a paper copy.

The link to the survey was sent to 172 e-mail addresses through the SSCP e-mail in an attempt to get a high response. This was followed by a reminder through telephone messages to 109 pharmacists whose phone numbers were available. Two pharmacists phoned back after experiencing technical difficulties which prevented them from moving from one page to the other. This was immediately investigated and resolved by the researcher over the phone. This led to the need to make phone calls to the pharmacists in case others experienced such difficulties. Another e-mail reminder was sent to the pharmacists via the SSCP with additional information about possible technical difficulties.

A decision was made to extend the time for the survey to an extra month as the response was low at the beginning but was increasing steadily especially after the phone calls. E-mails were again sent to all 172 email addresses giving them another chance to respond to the survey. This time the e-mails were sent directly from the researcher and not through the SSCP so as to account for any undelivered email addresses. Apologies were sent to the pharmacists via the e-mails in case they felt overwhelmed by e-mails about this research. The e-mails were again followed by phone messages to all pharmacists who had registered phone numbers. The survey was opened for two months from the 20th of April till the 25th of June 2014.

8.3 Analysis of the questionnaire

The BOS website provided some of the descriptive analysis of the results. However, to do more statistical tests the data was transferred into SPSS statistics package version 20. Descriptive analysis was conducted and the values reported as percentages as well as numbers due to the small number of participants. Cronbach's alpha (α) was used to measure the internal consistency of the set of questions in the questionnaire. The Mann–Whitney test was used to explore any differences in responses between the pharmacists based on gender and clinical hospital experience. A chi-square test was performed to examine any significant

relation between the gender of the participants and their current work in hospitals as clinical pharmacists.

8.4 Results

Twenty-four e-mail addresses out of 172 sent came back as failed-delivery. One pharmacist who participated in the final pilot sent a message apologizing for not taking part in the survey as she had participated in the pilot. It was difficult to exclude the other pharmacists who participated in the pilot based on e-mail addresses. Therefore, it is not known if the other pharmacists who participated in the pilot, responded or not to the questionnaire. Therefore, based on delivered e-mail addresses 51 pharmacists out of 148 (34%) participated in the survey with 47 pharmacists completing all survey questions. The data from all 51 participants were included for analysis in SPSS. The values for the questions which were not answered were entered as missing values in SPSS.

Participants' characteristics

There was participation from clinical pharmacists with a wide range of years of practice based on their graduation year from pharmacy school with graduates from 1982 to 2010. The majority of the participating pharmacists (92% (47)) did their post graduate clinical pharmacy course in Sudan between the years 2007 and 2011. The remaining pharmacists obtained their clinical pharmacy post graduate degrees from universities in India, Malaysia or UK. The participants' characteristics are summarized in Table 8.1. The participants were 71% (36) female and 29% (15) male which reflects the gender distribution of practising pharmacists in Sudan. A report from the Ministry of Health in Sudan in 2006 estimated that more than 70% of the pharmacists working in the government federal hospitals were females (Directorate of Pharmacy, 2006). Almost half of the clinical pharmacists who participated (49% (25)) were not currently involved in clinical work in hospitals. These participants were working in other sectors

of pharmacy practice including community pharmacy, academia, the Ministry of Health and for pharmaceutical companies. Some of the participants were currently working outside Sudan. The majority of the participants had clinical hospital work experience, while 24% (12) of the participants never worked as clinical pharmacists in hospitals in Sudan. Using chi-square test, no statistically significant relation was obtained between gender of the participants and their current work in clinical pharmacy.

Table 8.1 Characteristics of survey participants (pharmacists) (N=51)

<i>PARTICIPANTS' CHARACTERISTICS</i>	<i>FREQUENCY % OF PHARMACISTS</i>	<i>NUMBER OF PHARMACISTS</i>
Gender		
Male	29	15
Female	71	36
Clinical pharmacy course		
In Sudan	92	47
Outside Sudan	8	4
Currently working in a hospital in Sudan		
Yes	51	26
No	49	25
Previous clinical hospital experience in Sudan		
Yes	76	38
No	24	12

8.4.1 Role of the clinical pharmacists

In this section of the survey, pharmacists were asked about the different roles of clinical pharmacists in hospitals in Sudan. The vast majority of pharmacists were in agreement that the different roles presented were part of the clinical pharmacist job in hospitals in Sudan (Table 8.2)

Table 8.2 Role of the clinical pharmacist in hospitals in Sudan (N=50)

	STRONGLY DISAGREE% (N)	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
Provide drug related information	2(1)	2(1)	-	22(11)	74(37)
Educate patients about their medicines	-	-	4(2)	18(9)	78(39)
Identify drug related problems	-	-	-	27(13)	74(36)
Assist doctors in prescribing drugs	-	2(1)	15(7)	28(13)	55(26)
Provide drug related information mainly to doctors	6(3)	12(6)	14(7)	37(18)	31(15)
Inform doctors about availability of drugs	2(1)	8(4)	10(5)	39(19)	41(20)
Inform doctors about therapy guidelines	-	6(3)	12(6)	31(15)	51(25)
Take drug histories of the patients admitted	-	10(5)	6(3)	38(18)	46(22)
Inform doctors about cost effective medications	2(1)	4(2)	20(10)	38(19)	28(14)
Provide drug information mainly to patients	8(4)	14(7)	12(6)	38(19)	28(14)
Participate in clinical-care meetings	2(1)	2(1)	4(2)	35(17)	57(28)
Ensure prescribers are providing optimum therapy	-	2(1)	8(4)	27(13)	63(31)
To be involved in doctors' choices of medicines	-	8(4)	14(7)	24(12)	54(27)

The top two roles of clinical pharmacists with which almost all participants either 'strongly agree' or 'agree' on were; 'Pharmacists educating patients about their medicines' and 'Identifying drug related problems'. Furthermore, most of the participants were in agreement that the clinical pharmacists have a role in ensuring that prescribers are providing optimum therapy (90 % (44)), assisting prescribers in prescribing (83% (39)), advising prescribers on treatment guidelines (82 % (40)) and to be involved in the doctors' choices of medicines (79% (39)).

With regard to the clinical pharmacists' role being mainly to provide information to patients, 22 % (11) of the participants found that not to be true. Similarly only 18% (9) of participants did not agree that the role of clinical pharmacists is to provide drug information mainly to doctors.

The Cronbach alpha for this set of questions (13 items) was 0.9. This good consistency led to measure the overall positiveness of the participants to the role of clinical pharmacists in hospitals in Sudan. The total item score for the 13 items of the 5-point Likert scale was calculated to give an overall scale for the degree of positiveness. The mean value for the total scale was 56.8 (Table 8.3).

Table 8.3 Positiveness score of pharmacists views towards the clinical role of hospital pharmacists (N=39)

	VALUE
Mean	56.8
Median (Inter quartile-range)	57
Standard Deviation	7.6
Maximum score	65
Minimum score	34

Comparison between the groups

To conduct further analyses of the participants' views, the Mann-Whitney test was used to identify any differences in the participants'

views about the clinical pharmacist role based on their current working status as hospital-clinical pharmacist, previous clinical experience or gender. Current working status, gender and previous clinical experience were not found to significantly affect participants' views with regard to the role of clinical pharmacists.

8.4.2 Barriers to clinical pharmacy practice

In the next part of the survey, pharmacists were asked about their views with regard to a number of obstacles considered to be facing the clinical pharmacy practice and pharmacists in Sudan. The details of these results are shown in Table 8.4. The majority of the pharmacists were in agreement with most of the listed obstacles as barriers facing practice (Fig 8.1).

Interestingly 68 % (34) of the pharmacists did not consider that the limited support from doctors to be an obstacle for clinical pharmacists. On the other hand 59% (27) considered that there was resistance from doctors to pharmacists' involvement in prescribing. In addition, 61% (29) of the pharmacists thought of pharmacists more concern with doctors' approval to their role than actually performing their role as a barrier to their practice.

The pharmacists were also presented with statements examining personal characteristics of pharmacists that might affect their development as clinical pharmacists. There was a split between the pharmacists' views with regard to pharmacists themselves being resistant to change. While 48% (24) found this not to be true, 40% (20) were in agreement of this statement. With regard to the pharmacists' lack of communication skills as an obstacle in practice, 44% (21) of pharmacists were in disagreement with this statement while 40% (19) thought that communication skills is a true challenge to pharmacists. A large number of pharmacists 65% (31) either 'agreed' or 'strongly agreed' that there is a lack of confidence from clinical pharmacists which is creating an obstacle for practice.

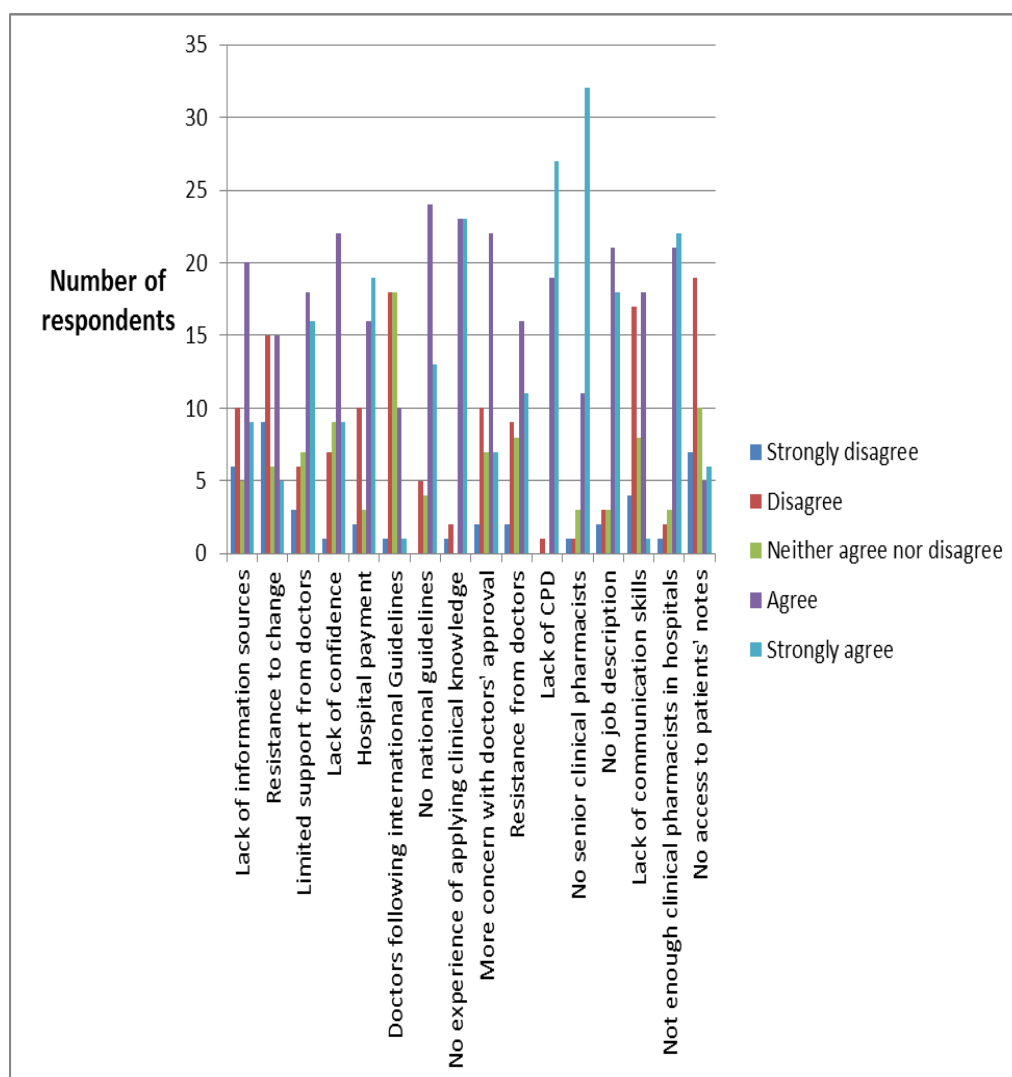
Table 8.4 Barriers affecting clinical pharmacy practice in hospitals in Sudan (N=50)

STATEMENT	STRONGLY DISAGREE %(N)	DISAGREE %(N)	NEITHER AGREE NOR DISAGREE % (N)	AGREE %(N)	STRONGLY AGREE %(N)
Lack of information sources	12(6)	20(10)	10(5)	40(20)	18(9)
Pharmacists' resistance to change	18(9)	30(15)	12(6)	30(15)	10(5)
Limited support from doctors	32(16)	36(18)	14(7)	12(6)	6(3)
Lack of confidence	2(1)	15(7)	19(9)	46(22)	19(9)
Hospital payment	4(2)	20(10)	6(3)	32(16)	38(19)
Doctors following 'international' guidelines	2(1)	21(10)	38(18)	38(18)	2(1)
Unavailability of 'national' guidelines	-	11(5)	9(4)	52(24)	28(13)
Lack of experience of applying clinical knowledge to practice	2(1)	4(2)	-	47(23)	47(23)
More concern with doctors' approval than performing the job	4(2)	21(10)	15(7)	46(22)	15(7)
Resistance from doctors' towards pharmacists' involvement in prescribing	4(2)	20(9)	17(8)	35(16)	24(11)
Lack of CPD opportunities	-	2(1)	-	40(19)	57(27)
No senior clinical pharmacists	2(1)	2(1)	6(3)	23 (11)	67(32)
No job description for 'clinical pharmacist'	4(2)	6(3)	6(3)	45(21)	38(18)
Lack of communication skills	8(4)	35(17)	17(8)	38(18)	2(1)
Not enough clinical pharmacists in the hospital	2(1)	4(2)	6(3)	43(21)	45(22)
Pharmacists have no access to patients' notes	15 (7)	40(19)	21(10)	11(5)	13(6)

*CPD: Continuous Professional Development

With regard to opportunities for continuous professional development (CPD), almost all pharmacists either 'agree' (40.4% (19) or 'strongly agree' (57.4% (27) that the lack of CPD is one of the obstacles facing the clinical pharmacy practice in hospitals in Sudan.

Fig 8.1 obstacles facing clinical pharmacists in Sudan



The set of statements (16 items) about the obstacles facing pharmacists had a low internal consistency with the value of $\alpha = 0.3$. A higher value of 0.4 can be obtained if the statement 'Limited support form doctors' was deleted. The issue of low values of alpha was previously

discussed in section 4.9.3. Although higher values of α (≥ 0.7) are required to show good consistency between the statements, it has also been argued that a lower consistency value indicates that items are testing a wide range of issues and that can be of an advantage depending on the objectives of the research (Taylor, 2014).

Comparison between the groups

Using the Mann-Whitney test, a statistically significant difference in response was found between participants with regard to whether or not they had previous hospital clinical experience and their responses with regard to some of the obstacles facing practice (Table 8.5). Pharmacists with hospital clinical experience were more likely to agree than those with no clinical experience that there are not enough clinical pharmacists in the hospitals ($U = 136$, $p = 0.037$). In addition, pharmacists with no clinical experience were more likely to agree than the other pharmacists that the lack of access to patients notes creates a barrier to practice ($U = 117$, $p = 0.024$). Furthermore, with regard gender, males were more likely to agree than females that there is a lack of confidence from the pharmacists' side that is creating a barrier to practice ($U = 104$, $p = 0.001$).

Table 8.5 Mann-Whitney Test to pharmacists' views about the barriers to clinical pharmacy practice

Statement *	Not enough clinical pharmacists	No access to patients notes	Statement **	Lack of confidence
Mann-Whitney -U	136	117	Mann-Whitney -U	104
Sig.(2-tailed)	0.037	0.024	Sig.(2-tailed)	0.001
Median***	Experience 4.5 No experience 4	Experience 2.5 No experience 3.5	Median***	Male 4 (Minimum 3, Maximum 5) Female 4 (Minimum 1,Maximum 5)

*Grouping variable: Clinical work experience

**Grouping variable: Gender

*** Median: 5 -point Likert scale

8.4.3 Use of clinical guidelines

In the previous section, 80 % (37) of the pharmacists felt that the unavailability of national clinical guidelines was an obstacle affecting their clinical practice. On the other hand 40 % (19) perceived the use of international guidelines by prescribers as an obstacle to their practice. In the final section of this survey, the pharmacists were asked about their opinions with regard to the use of clinical guidelines for prescribing in Sudan (Table 8.6).

Table 8.6 Pharmacists' views about the use of clinical guidelines in practice in Sudan (N=49)

	Strongly agree %(N)	Agree	Neither agree nor disagree	Disagree	Strongly disagree
It is not possible to implement clinical guidelines in practice in Sudan	4%(2)	23(11)	8 (4)	50(24)	15(7)
It is possible to implement international guidelines in practice in Sudan	17(8)	52(25)	8(4)	19(9)	4(2)
For guidelines to be followed they need to consider the socio-economic state of the specific targeted population	33(16)	53(26)	10(5)	4(2)	-
Guidelines need to be developed based only on scientific evidence	29(14)	33(16)	14(7)	21(10)	2(1)
The current prescribing in hospitals is not based on guidelines	31(15)	27(13)	27(13)	8(4)	6(3)
Pharmacists have a duty to ensure that doctors' are following evidence-based medicine when prescribing	35(17)	39(19)	12(6)	8(4)	6(3)
Adherence to written guidelines is not always desirable in clinical practice	4(2)	39(19)	27%(13)	22(11)	8(4)

The majority of pharmacists (65% (31) thought that it was possible to follow guidelines in clinical practice in Sudan. However, 58% (28) of pharmacists perceived that the hospital practice was not following any guidelines. Furthermore, while 69% (33) of participants were in agreement that international clinical guidelines could be applied in Sudan, 86% (42) perceived that guidelines need to suit the socio-economic condition of the patients.

When asked about their role in ensuring evidence-based medicine (EBM), more than 70% (36) of the pharmacists perceived that they had a duty to ensure that doctors are following EBM when prescribing. On the other hand the pharmacists diverged with regard to the use of guidelines in all circumstances, while 43% (21) perceived the statement 'Adhering to guidelines is not always desirable' to be true, 31% (15) were in disagreement with the statement.

The reliability test (α) for the above set of statements (7 items) was equal to 0.4 with a higher value of 0.5 obtained if the item 'Guidelines to consider the socio- economic state' is deleted. Lower values of α are said to be expected in scales with fewer number of items that is less than 10 (Pallant, 2005).

Comparison between the groups

There was differences in responses about the use of guidelines in Sudan between those who were currently working as clinical pharmacists and those who were not as shown in Tables (8.7 and 8.8).

Table 8.7 Differences in pharmacists responses on guidelines use based on current clinical work

STATEMENT	CURRENT CLINICAL WORK	STRONGLY AGREE (N)	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	STRONGLY DISAGREE
It is not possible to implement clinical guidelines in practice in Sudan	Yes (N)=23	-	4	1	12	6
	No (N)=25	2	7	3	12	1
It is possible to implement international guidelines in practice in Sudan	Yes (N)=23	7	11	1	4	-
	No(N)=25	1	14	3	5	2
For guidelines to be followed they need to consider the socio-economic state of the specific targeted population	Yes (N)=24	10	10	2	2	-
	No (N)=25	6	16	3	0	-
Guidelines need to be developed based only on scientific evidence	Yes (N)=23	6	7	5	4	1
	No (N)=25	8	9	2	6	-
The current prescribing in hospitals is not based on guidelines	Yes(N)=24	5	6	8	3	2
	No(N)=24	10	7	5	1	1
Pharmacists have a duty to ensure that doctors' are following evidence-based medicine when prescribing	Yes (N)=24	9	7	5	3	-
	No (N)=25	8	12	1	1	3
Adherence to written guidelines is not always desirable in clinical practice	Yes (N)=24	1	8	8	5	2
	No (N)=25	1	11	5	6	2

Table 8.8 Difference in pharmacists' responses on guidelines use (mean and median) based on current clinical work

STATEMENT*	CURRENT CLINICAL WORK	MEAN	MEDIAN	MAXIMUM	MINIMUM
It is not possible to implement clinical guidelines in practice in Sudan	Yes	3.9	4	2	5
	No	3.1	3.5	1	5
It is possible to implement international guidelines in practice in Sudan	Yes	3.9	4	2	5
	No	3.2	4	1	5
For guidelines to be followed they need to consider the socio-economic state of the specific targeted population	Yes	4	4	2	5
	No	4	4	3	5
Guidelines need to be developed based only on scientific evidence	Yes	2	2	1	5
	No	2	2	1	4
The current prescribing in hospitals is not based on guidelines	Yes	3	3	1	5
	No	2	2	1	5
Pharmacists have a duty to ensure that doctors' are following evidence-based medicine when prescribing	Yes	2	2	1	4
	No	2	2	1	5
Adherence to written guidelines is not always desirable in clinical practice	Yes	3	3	1	5
	No	3	2.5	1	5

* 5-point Likert scale

Using the Mann-Whitney test two statistically significant differences in responses were found between the participants based on their current practice with regard to the statements 'Possible to implement international guidelines in Sudan' and 'Not possible to implement guidelines in practice in Sudan' as shown in Table 8.9. The pharmacists who were currently working as clinical pharmacist were more likely to agree that it is possible to implement guidelines including international guidelines in Sudan than

those who were not working as clinical pharmacists. Using Mann-Whitney, gender had no effect on the views of the participants.

Table 8.9 Mann-Whitney Test for pharmacists' views about use of guidelines in Sudan

Statement*	Possible to implement international guidelines in Sudan	Not possible to implement guidelines in practice in Sudan
Mann-Whitney -U	190	179
Sig.(2-tailed)	0.029	0.016
Median	Yes 4 (Maximum: 5, Minimum: 2) No 4 (Maximum: 5, Minimum: 1)	Yes 4 (Maximum: 5, Minimum: 2) No 4 (Maximum: 5, Minimum: 1)

* Grouping variable: current hospital clinical work (Yes/No)

8.4.4 Survey participants' comments

At the end of the questionnaire the pharmacists were given the chance to add any further comments with regard to the issues discussed in the survey. The pharmacists had a few comments to add with regard to the obstacles facing their practice. These comments were grouped into main obstacles themes based on their content (Table 8.8). Some of these comments were related to the issues addressed in the questionnaire and the focus group discussion.

Table 8.10 Survey participants' (pharmacists) comments (N=10)

OBSTACLE	PHARMACIST'S COMMENT
Not enough effort from pharmacists to prove their role in patient care	"Clinical pharmacist should work hard to prove their important role in patient management plan because if this not done by us no-one can do it for us."
Limited resources	"Lack of tools is a big problem facing clinical pharmacy"
Not enough clinically trained pharmacists in hospitals	"Lack of enough clinical pharmacists in hospitals because they were scattered between hospitals, we need to implement the ideal role of clinical pharmacy with the optimum number of clinical pharmacists in a specific hospital [...]"
Job description	'The main problem facing clinical pharmacist in hospitals is a lack of job description [...] and the majority of managers in ministry of health do not understand the role of clinical pharmacist.'
Implementation of guidelines	'Guidelines in Sudan are very well implemented in three clinical areas, HIV, malaria and tuberculosis.'
Lack of clinically trained senior pharmacists	"No senior clinical pharmacist available in hospital to help the junior pharmacist with no experience."
Lack in clinical pharmacy module	"The study of clinical pharmacy in Sudan is mainly theoretical and there is no good implementation of clinical clerkship for student of clinical pharmacy in Sudan, moreover, the syllabuses of most colleges need to be revised and refined.'
Government role in healthcare	'Sudanese government haven't got the will or desire to improve healthcare or the people's health in Sudan, they don't care'

Summary of the results

- The majority of the pharmacists in the survey perceived that the different roles presented for pharmacists were part of the clinical pharmacist's job in hospitals in Sudan
- Pharmacists perceived that a number of obstacles were hindering the clinical pharmacy practice in Sudan. Some were related to the pharmacists themselves and others to the environment surrounding them.
- Most of the pharmacists considered the unavailability of national guidelines as a challenge to their practice. On the other hand, a large number of pharmacists felt that international guidelines could be implemented in practice in Sudan
- Pharmacists who were currently working as clinical pharmacist were more likely to agree that it is possible to implement guidelines including international guidelines in Sudan than those who were not working as clinical pharmacists

8.5 Discussion

Clinical pharmacy in hospitals is a relatively new area of practice in Sudan. The majority of pharmacists when presented with different duties related to clinical pharmacy practice expected the clinical pharmacists in Sudan to be performing most of these duties.

There were roles which achieved an overall agreement by pharmacists as part of the clinical pharmacist's job. These were the education of patients about their medicines (96% (48)) and identifying drug related problems (100% (49)). There was also almost overall acceptance from pharmacists in that their role in hospitals involved participation with prescribers in providing optimum therapy. The latter can be considered to be a positive move from the clinical pharmacists of Sudan towards accepting their responsibility in ensuring that patients get the maximum benefits from their medication.

With regard to the use of guidelines in prescribing, the participants seemed to be positive about the implementation of evidence-based medicine in prescribing. The majority of pharmacists (65% (31)) perceived that clinical guidelines can be used in practice in Sudan and pharmacists have a duty to make sure that guidelines are followed. However, a high number of pharmacists (58% (28)) could not consider the practice in hospitals as adopting guidelines. On the other hand, the majority of participants considered the lack of national guidelines as a barrier facing their practice. This issue of guidelines availability was also brought forward by the pharmacists in the FGD conducted earlier (chapter 7). This shows that although the pharmacists in Sudan seemed to be willing to embrace prescribing based on guidelines, more than half of the pharmacists felt that the current practice in hospitals is not based on guidelines. The pharmacists also considered that in the absence of the national guidelines and potentially the lack of access to information, their role in ensuring prescribing based on evidence is very much hindered. In a study in Jordan, limited access to information sources was also identified by

pharmacists as making them less capable of ensuring evidence-based prescribing (Abu Farha, 2014).

While the majority of the participant pharmacists (86% (42)) perceived that for guidelines to be implemented they need to consider the socio-economic state of the patients, (69% (33)) of the pharmacists were not against implementation of international guidelines in practice in Sudan. This may be contradicting perceptions considering also that pharmacists thought that the unavailability of national guidelines is a challenge to their practice. However, a possible explanation of these perceptions is that in the absence of national guidelines, it is possible for the clinical practice in Sudan to embrace international guidelines. This is similar to what most of the prescribers in Khartoum cardiology units perceived in that in the absence of national guidelines, international guidelines can be used with certain adaptations so as to suit the patients of Sudan (section 5.5). One of the pharmacists also commented that in certain diseases such as malaria, HIV and tuberculosis, guidelines are very well followed in Sudan. The reason for this may be because these guidelines even if they are not national guidelines, are very much made considering the patients residing in more deprived countries who are most affected by these diseases. Interestingly, the clinical pharmacists who were currently working in hospitals were more positive in their views about the possibility of implementing guidelines in hospitals in Sudan than those clinical pharmacists who were not working in hospitals.

With regard to the obstacles facing pharmacists, these can be divided into two groups. The first group is about pharmacists themselves being the barrier to role change. The pharmacists in this study seemed to be almost divided with about half of the participants perceiving the personal characteristics such as a lack of communication skills and the attitude towards changing the professional role as challenges to their practice. There was more widespread acceptance (65% (31)) from participants in

considering pharmacists' lack of confidence as affecting clinical practice. However, most of the pharmacists felt that they faced the difficulty of applying what they learnt as clinical pharmacists to practice. The argument that pharmacists' attitudes have prevented them for making role changes was previously discussed (Al Hamarneh et al., 2011, Hall et al., 2013, Rosenthal, 2010). The claim was that the key constraint to advancement of clinical pharmacy practice is due to more than just external factors such as resistance from the doctors and the healthcare organizations or lack of enough pharmacists. The main obstacle was seen to be the pharmacy culture which is resistant or very slow in shifting from the 'comfortable zone' of drug focused practice to the 'unknowns' of the patient centred practice. However, it can be argued that since the pharmacists in many parts of the world have made the move from the comfortable zone of the dispensary to the unknown world of the medical wards, they have already overcome this suggested restricting 'pharmacy culture'. With regard to other personal characteristics, the pharmacists in this study accepted that some of the constraints to their advance in practice, were related to factors such as lack of confidence. It can be expected with clinical pharmacy being a new area of practice in Sudan such lack of confidence may occur. However, the assumption is that with more time and as more skills are acquired, pharmacists will be able to overcome these personal barriers that are restricting their development.

The second group of obstacles included challenges such as not having senior clinical pharmacists as role models or having prescribers resistant to pharmacist involvement. Many of these obstacles were also faced by pharmacists in the FGD (chapter 7). The need for support from prescribers and the acceptance of prescribers to the pharmacists' role was discussed earlier (section 7.5). Interestingly 68% (34) of the pharmacists in this survey did not perceive the lack of support from doctors to be an obstacle to their clinical pharmacy practice. Whether this means that the doctors were supporting them or they did not see that they need doctors' support

is not known. However, more than half of the participants (59% (27) considered that doctors' resistance to pharmacists getting involved in prescribing as a challenge to clinical pharmacy practice. This again resonates with previous findings in this study (section 5.5), and other studies that the prescribers may be less comfortable with advanced roles of the clinical pharmacists such as recommending prescription drugs (Awad, 2007, Matowe et al., 2006, Smith et al., 2002, Tahaineh et al., 2009, Zaidan et al., 2011).

The pharmacists also considered the lack of a job description for clinical pharmacy as a major obstacle to their practice. When presented with the different roles for clinical pharmacists in the hospital, the majority of the pharmacists seemed to identify these roles as part of the clinical pharmacist job. As a new role one can understand the uncertainty these pharmacists are facing in deciding to what extent this new 'clinical' identity will allow them to intervene in patient management. Having certain standards for clinical pharmacy practice in Sudan that will consider the healthcare system in Sudan and the resources available is expected to be of benefit to the practice and the pharmacists. Some of the pharmacy governing bodies, for example the American College of Clinical Pharmacy has put standards for clinical pharmacy practice ((ACCP), 2014). These standards describe the duties of clinical pharmacists not only for pharmacists' benefit but also for other healthcare professionals to know what to expect from clinical pharmacists.

Although a smaller number of pharmacists (24%(11)) identified the lack of access to patients' notes as an obstacle to practice, this can be considered as a major challenge for clinical pharmacists in hospitals in Sudan as this is the first step in being able to provide patient care. This can be either due to resistance from other healthcare professionals to pharmacists using or writing on the medical notes or hospital policies that do not recognize the need for pharmacists to have access to patient notes. This issue was identified by some clinical pharmacists in their first SSCP meeting which was attended by the researcher.

The number of clinical pharmacists in hospitals that were identified in this study was found to be small compared to the larger number of non-clinical pharmacists who also work in the hospitals. Although it is expected that there would be fewer clinical pharmacists in Sudan than non-clinical pharmacists, the survey found that half of the participants who were clinical pharmacists were not actually working in hospitals. The actual cause of this is unknown but some explanations can be suggested. For example, the rate of pay in hospitals as identified by some pharmacists as a barrier to clinical practice may be one of the reasons for pharmacists with post graduate clinical pharmacy not to choose to work in hospitals. Furthermore, there may not be enough 'clinical pharmacist' jobs compared to non-clinical in the hospitals as the managers may not be still supporting the need for more clinical pharmacists as explained by the pharmacists in the FGD (section 7.4). It may also be a personal decision from the pharmacists that although they acquired the clinical post-graduate degree, they do not necessarily link that with hospital work.

The pharmacists in the survey as well as in the FGD identified that CPD is a challenge facing them. Pharmacists seem to be aware that obtaining their clinical pharmacy speciality is just a start in their clinical career. Despite limited resources or lack of support from senior healthcare professionals, pharmacists may need to take the initiative themselves and find suitable methods to undertake CPD. It is hoped that now with the effort put by the Sudanese Society of Clinical Pharmacists to organize training sessions in different areas of clinical care (section 2.12.2); this may be a starting step for the pharmacists for professional development. However, the society need to consider that pharmacists not only require to get more clinical knowledge but also need to develop certain skills and competencies such as communication skills and the means of transferring their clinical knowledge to practice that will enhance their professional status.

The pharmacists in their open text comments at the end of the questionnaire considered different difficulties facing the current practice. Most of these issues were also identified from the FGD and the prescribers' responses to the questionnaire, for example, the unavailability of senior trained staff, the lack of enough clinically- trained pharmacists and the absence of a defined description of the clinical pharmacist's job. These comments emphasized that the questionnaire touched on many of the difficulties that were encountered by clinical pharmacists in Sudan.

8.6 Limitations and strengths of the survey

The response rate to the questionnaire was difficult to determine. The response rate could be based on the e-mail addresses, the pharmacists with e-mail addresses and phone numbers or the pharmacists who were actually registered with the SSCP. The list of clinical pharmacists registered with the Sudan Medical Council which included the pharmacists registered with the SSCP contained e-mail addresses as well as some phone numbers for the pharmacists. Therefore, all pharmacists with e-mail addresses were included in the questionnaire and the response rate for this survey was based on the delivered e-mail addresses.

A technical difficulty was encountered by some of the pharmacists in this study. Once the researcher was informed, e-mails were sent as well as phone calls made to explain to the pharmacists about possible technical difficulties and how to resolve them if encountered or to contact the researcher. None of the pharmacists contacted by phone had experienced any difficulties but the majority who were called had not yet at the time of the phone call made an attempt to reply to the questionnaire so the phone calls also served as a reminder. Although the technical error was later corrected on the online survey and the time for the survey was extended, it is not known to what extent it affected the response rate.

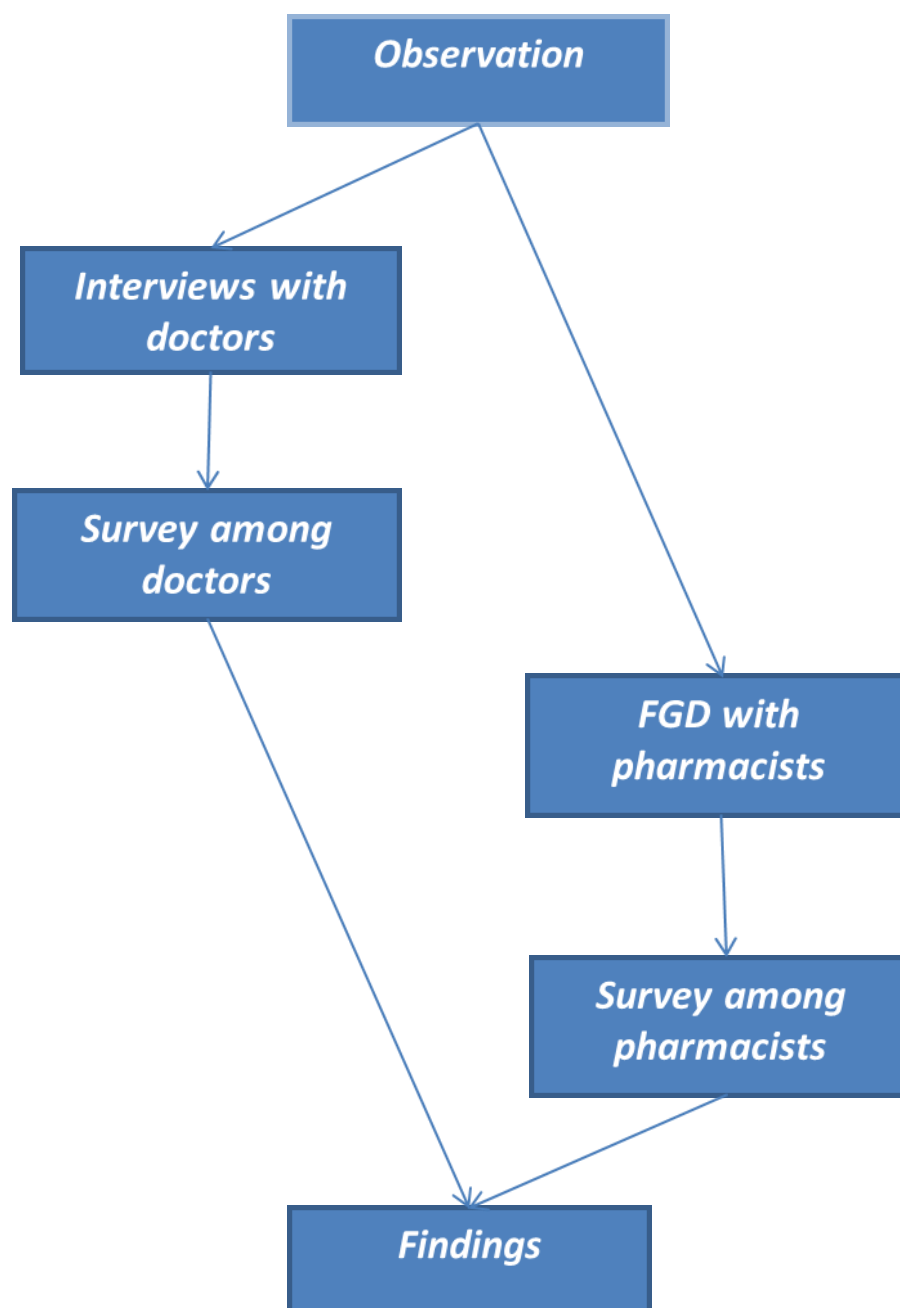
Another limitation as with all self-reports is that it is not possible to confirm that the actual responses reflected the true behaviour of the participants. Although measures such as anonymity and confidentiality were used to minimize effects like social-desirability bias, the risk of such bias cannot be ruled out.

Similar to the previous survey limitations (sections 6.6), there were limitations in the statistical analysis. Due to the relatively small number of participants, it was not possible to perform certain statistical tests or no significant relations or differences between the groups were obtained when a test was carried out.

The use of online survey can have its limitations including technical difficulties, availability and quality of the internet service and the ease of using the internet for some participants. However, the main contact available for the majority of clinical pharmacists was their e-mail address which implied that the pharmacists were using electronic mail. In addition, using the online option for the survey proved to be of value as some of the respondents were currently working outside Sudan.

Finally, the findings were based on the results obtained from the pharmacists who responded to the questionnaire. The small sample of participants creates a potential response bias. It is not known if those who did not respond would have a different perspective of the issues explored in the survey. However, the responses obtained were still considered to be of value as they shed light on a new area of practice in Sudan. The study has managed to capture the views of clinical pharmacists with regard to the challenges they are facing in their new practice that is hoped to benefit the progress of clinical pharmacy in the country.

CHAPTER 9 FINAL DISCUSSION AND CONCLUSION



9.1 Introduction

This final chapter presents a discussion of the key findings of this study. The chapter also presents the strengths and limitations of this study, the conclusion and the contribution of this study to knowledge. Finally, the researcher presents a personal reflection on how her preconceived notions about this study were transformed during the research process and the way forward from the findings obtained.

The main aim behind this study was to explore if guidelines were used by prescribers in Sudan, if guidelines can be implemented in practice and if international guidelines are suitable to be used in Sudan. The other part of the study aimed was to investigate the influence of clinical guidelines on the practice of clinical pharmacists in Sudan and further explore the pharmacists' new clinical role with the challenges facing them. To achieve the above aim, the study explored the perceptions and views of some of the prescribers in cardiology and clinical pharmacists in Sudan. The research is thus exploratory in nature. Exploratory studies are considered to be different from explanatory and evaluation studies in that they have no intentions of describing causes, evaluating conducts or generalizing results (Sue and Ritter, 2012). The study have achieved its aim by identifying the prescribers and pharmacists' perceptions with regard to the issues presented above as will be discussed in the following section.

9.2 Summary of the key findings and discussion

The use of guidelines in clinical practice has been regarded as a means of providing healthcare of high quality by providing unified scientific-based approach to treatment (Berg, 1997, Hewitt-Taylor, 2006, Keeley, 2003, Woolf et al.,1999). With regard to the possibility of implementing guidelines in clinical practice in Sudan, the majority of the doctors who participated in this study thought that it is possible to apply guidelines in practice in Sudan. These doctors were found to rely on international

guidelines when prescribing for their patients. Using international guidelines was considered as a suitable option in the absence of national guidelines. Doctors who were using international guidelines were trying to adapt the foreign guidelines to the healthcare situation in Sudan. Difficulty in implementing foreign guidelines is expected when they are applied to different populations (Hajjaj et al., 2010, Keeley, 2003). The main limitations for the doctors in following the international guidelines in Sudan were thought to be, the availability of the drug, the high cost of the drug and follow up of the patient's treatment after discharge. Thus the doctors were choosing from the international guidelines what can be applied in Sudan and for their type of patients. This may be a logical approach in trying to implement evidence based treatment promoted by these international guidelines in settings with limited resources. However, this approach can affect the benefits expected from guidelines which can only occur when guidelines are taken as a whole set of recommendation whereby each part of the evidence is linked to the other. Some has cautioned that not following the sequence of treatment as presented in the guidelines can lead to the treatment provided not to be based on evidence (Fried and Krabshuis, 2008) .

The solution in implementing clinical guidelines in healthcare settings like Sudan can be seen in having national guidelines to suit the patients and the healthcare system of the country. The concept of guidelines adapted for settings where there are particular social conditions and limited resources issues, is recognised and has been promoted in order that the perceived benefits from guidelines are not missed by patients in different parts of the world (Lindback et al., 2014, WHO, 2005b). However, the challenge for countries with limited resources is that it is considered a costly process to make guidelines from scratch (Feder et al., 1999). During this research it was found that there are national guidelines in hypertension in Sudan ((SSH)), 2012). Unfortunately, many of the doctors involved in this study were not aware of the existence of such guidelines. Different elements may have led to these guidelines not being recognized or used by most of the doctors in cardiology. For example,

when interviewed, few doctors were sceptical about the ability of a number of healthcare professionals in writing suitable clinical guidelines. Some also criticized the national guidelines as being a duplication of other international guidelines and therefore, not fit for practice in Sudan.

It was difficult to determine if the guidelines made in Sudan were suitable for Sudanese patients as it seemed that they were not used by the majority of prescribers. Considering the resources required in constructing guidelines from the beginning, the national guidelines in hypertension in Sudan were adapted from British, European and World Health Organization guidelines ((SSH)), 2012). Recently, the Pan-African Society of Cardiology emphasized the need for making guidelines based on studies on African patients in order to achieve the best management of diseases like hypertension (Dzudie et al., 2015). However, in the absence of such local studies, and with the limited resources available, national guidelines in countries like Sudan will presumably continue to be adapted from international guidelines. In such case, these adapted guidelines should consider the resources of the healthcare system and the type of patients involved in order for them to be applicable in practice. Furthermore, the authors of such guidelines may need to be chosen according to certain criteria to be inclusive of not only medics but a variety of expertise and even patients' representatives in order to ensure applicability of the guidelines and also add credibility to it. Some studies have suggested that the risk of bias from non-inclusive guidelines developing committees may be a great limitation for the use of guidelines (Shaneyfelt and Centor, 2009, Woolf et al.,1999). A number of doctors in this study shared a similar view in that the individuals involved in making the guidelines should have certain characteristics in order to produce guidelines that can be implemented in practice.

Although the recommendations of international organizations such as the WHO is for guidelines to be made to suit the socio economic state of

the healthcare settings in which they are applied (WHO, 2005b), some have also argued that to be able to use guidelines, certain specifications need to be available in the health care system (Feder et al., 1999). This later argument was shared by some of the prescribers in Sudan who considered that it was not possible to implement any guidelines in practice in Sudan as hospitals even within Khartoum, the capital, were not able to provide comparable services. For those prescribers who could not depend on guidelines, prioritizing personal experience when prescribing was the solution. The debate about following experience versus guidelines was previously raised in a number of studies (Armstrong, 2002, Nutescu et al., 2005). The suggested way forward is that prescribers do not need to choose between either following experience or following guidelines. Prescribers can depend on the guidelines to direct them to rational approach to treatment but they can use their experience and judgement to make their final decision.

Considering all the above challenges in using guidelines especially in healthcare settings with limited resources, there does not seem to be a one solution to overcome all the difficulties. Considering Buteow et al (1997) definition of appropriate prescribing which is prescribing that 'maximizes net individual health gains within society available resources', it can be suggested that a possible solution to the use of international guidelines in countries like Sudan is to provide evidence from research to support doctors in that their manipulation of foreign guidelines to suit certain settings provide more benefit than harm to patient care. However considering the status quo, the practical approach will be to consider the benefits from treatment recommended by guidelines but accept that guidelines are there to guide and not rules to be followed blindly. As Sacket (1996) has defined EBM which is the base for clinical guidelines, as 'using the best evidence to make the final clinical decision', the final decision on prescribing will lie with the prescriber who should consider the suitability of applying the recommendations of the guidelines to the specific patients in the specific healthcare setting in order to achieve appropriate prescribing.

Although the lack of national guidelines did not seem to greatly affect the practice of the participating doctors, it was perceived by many clinical pharmacists and a few doctors as limiting the contribution of the pharmacists in the hospitals. The use of unified guidelines that all healthcare professionals can follow in their practice can be an advantage to healthcare professionals and also streamline the approach to patient management (Woolf et al, 1999). Most of the pharmacists considered that clinical practice in Sudan was not following any particular guidelines and that was seen as an obstacle in their clinical practice. However, the pharmacists may not have considered that even if guidelines were used in practice, they as pharmacists may face challenges in applying these guidelines. Other health care professionals, for example nurses, have perceived different barriers in implementing guidelines in clinical care settings including the ability to interpret the guidelines themselves (McCaughan et al., 2002).

Similar to what some studies claimed to be a positive effect of guidelines on prescribers (Berg, 2000), it may be that the use of guidelines can enhance Sudanese pharmacists' professional status by giving them the knowledge, skill and power to make their interventions. On the other hand, it may also be a professional characteristic of pharmacist that make them perform better in the presence of certainty and standardized information which is provided by guidelines recommendations. As other authors have argued, this certainty contradicts the element of professionalism which is considered by many to rely on the element of indeterminacy (Hall, 2013, Traynor, 2009). This indeterminacy as explained by Hall (2013) is an element of professionalism that makes professionals contrary to the lay person, able to process information and perform activities which cannot be directly derived from written text. Interestingly, this professional indeterminacy that guidelines limit, is one of the argued reasons that make some prescribers resist the use of guidelines (Armstrong, 2002, Traynor, 2009). On the positive side, whether guidelines contradicts indeterminacy or not, considering that

guidelines are providing evidence based medicine, pharmacists were found to enhance adherence to guidelines medications in healthcare resulting in improved patient outcomes (Horning et al., 2007).

The existence of a specific pharmacy culture that makes pharmacists resistant to make a change to a more patient-centred role has been argued by some authors (Al Hamarneh et al., 2011, Al Hamarneh et al., 2012, Hall et al., 2013, Rosenthal, 2010). Certain trends in pharmacists' personalities and attitudes have been claimed to be a barrier in pharmacists making the move to acquire new roles in patient care. Pharmacists are seen as having a fear of venturing into new areas and thus they are resistant to be directly accountable and sharing responsibility for patient care. The pharmacists in this study were divided in considering whether or not it is pharmacists' personal characteristics that are standing in the way of change to clinical role.

The majority of prescribers in this study were receptive towards a clinical role for hospital pharmacists. In addition, the majority of the participant pharmacists did not perceive that the lack of support from doctors to be a challenge for their clinical practice. Some of the pharmacists considered some doctors to be very supportive while others were not. The pharmacists felt that the lack of senior clinical pharmacists in hospitals who can support the new clinical pharmacists and act as leaders as one of the major challenges facing practice. Being a new area of practice in Sudan, the current clinical pharmacists need to consider themselves as the leaders to the new practice, especially as a large number of those who did the clinical pharmacy course had a previous hospital work experience. The leaders of clinical pharmacy practice in many parts around the world were the pharmacists who were working in hospitals but made the move from being pharmacy based to being available on the wards (Cousins, 1995, McLeod, 1976).

Clinical pharmacists in Sudan were found to have undertaken a post graduate training in clinical pharmacy to be able to practice as clinical pharmacists in hospitals. This means that there are currently two tiers of pharmacists in Sudan, clinical and non-clinical pharmacists. Both were found to be working in the hospitals in Sudan but only clinical pharmacists were expected to have ward duties. The concern regarding two tiers of pharmacists was previously raised in that it allows different levels of services to be provided by pharmacists (Provost, 1972). This can create confusion among the public and healthcare professionals about what service to expect from pharmacists which is not in favour of the profession. However, many of the available undergraduate pharmacy courses were perceived as not providing the required clinical training. Even the post graduate course which was undertaken by the majority of the pharmacists in this study and was the first of its kind in Sudan, was not satisfying to all pharmacists. Although many new schools of pharmacy have started to include clinical pharmacy training in their curriculum, some academics in Sudan seem to be resistant to the complete shift to clinical based training (Mohamed, 2011). The argument is that this may undermine the importance of teaching other subjects traditionally taught in pharmacy schools which are considered as a core in giving pharmacists the required scientific base.

Many of the participating pharmacists identified the need for a less theoretical and more clinical approach to pharmacists' training. The later has been discussed in previous studies where the emphasis on a change in pharmacy teaching was perceived to be the main element in creating competent pharmacists (Hammer, 2000, McLeod, 1976, Hepler and Strand, 1990, Schafheutle et al., 2013). This is not only about acquiring the clinical knowledge required for practice, but also to understand and learn elements of the professional identity that is expected from pharmacists. This professional identity includes the professional ethical parameters of the profession, the responsibility of the job, the professional behaviour and the interprofessional communication (Bossers et al., 1999,

Broadhead and Facchinetti, 1985). The pharmacists in this study identified the lack of some of the above professional elements, for example, the interprofessional communication skills and the exact responsibility of the job as obstacles in their clinical practice.

It is argued that pharmacists alone could not advance without the support of the healthcare institutions in which they are practicing (Hepler and Strand, 1990, Phillips et al., 1987). This is similar to what some pharmacists in this study explained in that the lack of support from the healthcare authorities and hospital managers is a challenge facing them in developing their practice. This support whether in the form of training or availability of resources was considered by some pharmacists to be a requirement in order to progress in clinical practice. The Federal Ministry of Health in Sudan supported the call for improvement of hospital pharmaceutical services to meet future challenges (Directorate of Pharmacy, 2006). Currently clinical pharmacists in Sudan are recognized as specialist pharmacists in contrast to non-clinical pharmacists. Some effort as explained by a number of pharmacists was also put by Khartoum State Ministry of Health in arranging a number of meetings to support the clinical pharmacists working in some of the state hospitals. However, still many clinical pharmacists have not been encouraged to work in hospitals, like half of the pharmacists who participated in this study. As pharmacy is only one issue out of many concerns facing the healthcare system, it may be a while before the health authorities will have the resources to put into clinical pharmacy practice in Sudan.

Finally, the changes that happened in pharmacy practice through the years from compounding, to dispensing to clinical duties has provided a challenge for the pharmacy profession to change the role specification so as to maintain its place as a recognized profession. Considering the changes that are either advocated for pharmacy practice or those which have already taken place, it seemed from this study as well as identified

by other authors that there is a need to identify the exact role of the pharmacist of today (Elvey et al., 2013). The assumption is that unless the exact role of the pharmacist is clearly known, pharmacists will struggle to get the recognition for their new clinical identity. In this study, the effort exerted by some pharmacists in getting prescribers' recognition seemed to be at the expense of the effort that needed to be spent by the patient's bedside. However, the assumption that there is a one model or one role for clinical pharmacy practice that fits all may be far from realistic. Although many pharmacy bodies in different countries especially those with advanced clinical pharmacy practice may have set descriptions and standards for clinical practice, these may not fit with the practice in Sudan. This is similar to the challenges that prescribers have encountered in trying to implement international guidelines in clinical practice in Sudan. There is no doubt that there is a need for certain standards for practice. However, with the obstacles encountered in practice, clinical pharmacists of Sudan together with pharmacy regulating bodies in Sudan need to set the standards and the job specification for practice that suits the patient and the healthcare system of the country.

Summary of the main findings:

- Prescribers in Sudan were largely dependent on foreign guidelines for prescribing.
- A number of challenges were facing prescribers in applying foreign guidelines in Sudan
- A number of prescribers considered that it is not possible to implement guidelines in practice in Sudan
- The clinical pharmacists were challenged by the non-existence of unified guidelines in hospital practice in Sudan
- Other obstacles were identified as facing the new practice of clinical pharmacy ranging from difficulty in translating clinical knowledge into practice, lack of certain personal skills to the environment they were working in

9.3 Strengths and limitations of the study

Different steps were taken in this study to enhance validity and reliability of the quantitative and qualitative methods used and hence add trustworthiness to the results obtained. In addition, to ensure the concept of rigour, detailed explanation of the steps used in this research, care for details and also honest approach during the whole research process was maintained. As it may not be possible to generalize the findings of this study, a degree of transferability of these findings can be expected to be applicable in similar settings to where the research was conducted.

Quantitative methods

Face, content and construct validity were used to enhance the validity of the quantitative part of this study. Reliability test for internal consistency between the set of statements used in the questionnaires was performed using values of Cronbach's alpha.

Qualitative methods

Although reliability measure is debatable in qualitative research (Bowling, 2009a), certain measures were used to increase transparency and credibility of the qualitative data obtained. The background and the experience of the researcher were stated as these may have an influence in the collection, analysis or interpretation of data. To enhance transparency, the themes and codes obtained from the analysed data were checked by the supervisors in the University of Bath. In addition, an independent pharmacist was asked to check the transcribing and translation of an interview of his choice.

Although there were different methodological limitations with each method, an effort was made to minimize these limitations whenever possible as explained in sections 5.6, 6.6, 7.6 and 8.6.

Finally, this was the first time for the researcher to use any of the qualitative and the quantitative methods applied in this study. Thus every

step of this work was training and learning experience for the researcher. Therefore, with greater experience, it is possible that any of these methods could have resulted in different findings.

9.4 Conclusion

The findings of this research identified that prescribers in Sudan were largely dependent on foreign guidelines for prescribing. The prescribers were facing a number of challenges in trying to adapt the recommendations of the foreign guidelines to the situation of the patient and the healthcare system in the country. This was considered as the only practical approach in the absence of national guidelines. However, research is required to determine whether this adaptation of foreign guidelines, which is most of the time done individually, will lead to the most possible appropriate prescribing that can be achieved in limited-resources healthcare settings. The pharmacists on the other hand, although not against the use of foreign guidelines in clinical practice in Sudan, were challenged by the non-existence of unified guidelines to treatment that is agreed upon by both pharmacists and doctors. Again studies are required to understand the influence of having guidelines in practice on the professional performance of pharmacists.

The clinical pharmacists in Sudan were facing many challenges in their new practice. Although some of these challenges were created by the surrounding environment of healthcare in Sudan, these new pharmacists need to share the responsibility in trying to overcome these obstacles and pave the way for clinical pharmacy practice in Sudan.

9.5 Contribution to knowledge

What is known about this topic is that clinical guidelines need to be suitable for the patients and the healthcare system they are supposed to be applied in. On the other hand, it is also known that creating guidelines requires considerable resources and it may be a costly process for many

healthcare bodies especially in developing countries. However, a solution to such a dilemma appears not to have been yet reached. With regard to pharmacists, it was shown that pharmacists in the presence of guidelines play a positive role in ensuring adherence to medications guidelines. However, the influence of the availability or non-availability of clinical guidelines on the practice of clinical pharmacy was rarely studied.

This study is considered to be a contribution to research in healthcare in Sudan by looking into areas which have not been studied before. This study may also help to emphasize the importance of examining healthcare from the views of different professions to increase the interprofessional link as team work should be the aim for better health care.

The use of online questionnaires in this study was of interest to many pharmacy researchers in Sudan who contacted the researcher to know more about the process. This was an innovative approach and may contribute to how researchers in Sudan can now think of making use of the World Wide Web to start adopting new methods in conducting research.

In addition, qualitative methods such as interviews and focus group discussions were rarely used in pharmacy research in Sudan. This research can thus add to show the benefits of these methods in pharmacy practice research.

The findings of this study, although limited to certain healthcare settings in Sudan and involved a limited number of participants, is expected to be of value to healthcare policies in Sudan and furthermore for other healthcare organizations that share resemblance to Sudan.

9.6 Reflection

At the beginning of this research and based on the researcher's previous experience, the idea was to find out if doctors in Sudan are following the prescribing guidelines for heart disease that are used by doctors in countries like the UK so that the patients in Sudan would not miss the benefits of the drugs recommended by these guideline. The other thought based on the knowledge that there are now clinical pharmacists in hospitals in Sudan, was that how these pharmacists are managing to provide interventions assuming that there were no guidelines in practice in Sudan.

After starting the research and spending time in the hospitals in Khartoum this idea started to change gradually and the question became more about how possible it is to apply international guidelines in Sudan considering the current healthcare situation in Sudan and the socio-economic factors of the patients in Sudan. My thoughts became that guidelines are not just about prescribing drugs but linked with these drugs there are other factors such as follow ups and monitoring which are necessary to get the maximum benefits from these drugs. The feasibility of that in Sudan may be questionable.

Also my initial idea was that as pharmacists we need guidelines in practice to make our interventions in patient care so that patients can get the maximum benefit from their treatment. But during the research and as talking to pharmacists I started thinking if guidelines as a set of recognized recommendations for drug use, provide us pharmacists with the confidence we need (or lack) to communicate with prescribers. It may be also be that we as pharmacists are set to 'function better' professionally if we depend on what can be perceived as a 'solid' form of information that cannot be faulted.

9.7 The way forward

Attempts have already been made to apply some of the findings of this study. Several ideas for future work in hospitals in Sudan were identified and were presented by the researcher to the pharmacists in a meeting of the Sudanese Society for Clinical Pharmacists (SSCP) to which the researcher was invited. These suggestions can be summarized as follows:

- As there is a wide agreement especially from pharmacists on the need for national guidelines, more effort should be made to have national guidelines, probably adopted from international guidelines that are acceptable to all healthcare professionals involved, with pharmacists contributing to the development of these guidelines that will take into account the healthcare system in Sudan. One of the interviewed doctors in Ahmed-Gasim hospital mentioned that there is a plan to make local cardiology guidelines with the help of the clinical pharmacist to be used in the hospital.
- To have a source of information for the use of drugs in Sudan that is agreed by all healthcare professionals as their main provider for information. The British National Formulary (BNF) was found to be used by some prescribers and pharmacists but the current versions were not always available. During data collection in Sudan, the researcher became aware that there were plans from the Ministry of Health to restart printing the Sudanese National Formulary (SNF) which was previously available but its issuing has stopped for a number of years. The SSCP can work with the Ministry of Health to push forward the production of the SNF.
- To have the non-clinical pharmacists working in the dispensary to be involved in patient care on ward level.

- Now that it is almost ten years since the start of the clinical pharmacy course in Sudan, clinical pharmacists with experience could be involved in training of other pharmacists in the post graduate clinical course.
- To have separate drug charts for prescribing as no drug charts were used in the hospitals. Upon request, a version of a drug chart used in one of the hospitals in UK was given to the pharmacists in Alshaab hospital.
- The clinical pharmacists need to be more involved with patients on ward level and especially in doing medication reconciliation and managing the patients' medications as currently only the doctors are taking drug histories and the nurses are managing the medications on the ward.
- Clinical pharmacists to get an exchange of experience with other clinical pharmacists abroad or having clinical pharmacists from abroad to provide training in Sudan. An attempt was made by the researcher to arrange placement for the clinical pharmacists in Ahmed-Gasim hospital by contacting one of the Sudanese pharmacists working in hospital in UK. In addition during this study the researcher gave a lecture to the clinical pharmacists in Sudan about clinical pharmacy practice in hospitals in UK.

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APPENDICES

Appendix 1 Ethical approval

Republic of Sudan
National Ministry of Health

HEALTH RESEARCH COUNCIL

NATIONAL RESEARCH ETHICS REVIEW COMMITTEE

Date: 3/1/2011

Ethical Clearance Certificate

This is to certify that the proposal (No. 145-3-11) entitled (Prescribing in cardiovascular disease in Khartoum Hospitals and the role of the hospital pharmacist in the therapeutic management of the disease) introduced by Miss Hwaida Misbah Elsadiq, from University of Bath , has been approved by the National Health Research Ethics Committee, National Ministry of Health to be carried out in the Sudan.

The principal investigator is requested to submit a copy of the final report to the National Health Research Ethics Committee.

3/1/2011

 Dr. Inan Abdalla Mustafa
 Reporter of the
 National Research Ethics Review Committee

Appendix 2 Interview guide

Semi-structured interviews with prescribers in cardiology

Topic Guide

1- Background

- Participants' characteristics
- Current position
- Practicing years
- Previous work experience

2- Influences on prescribing

- Factors influencing prescribing
- Parameters that guide the prescribing of pharmacological interventions
- Availability and use of guidelines
- Use of international guidelines

3- Role of clinical pharmacists

- Pharmacists as part of the healthcare team in hospitals
- Doctor-pharmacist interaction
- Pharmacist input on prescribing

Any further arguments that the prescriber like to raise

Thank you for your time

Appendix 3 Information to healthcare professionals

Part1:

Information for healthcare professionals

Dear Dr/Mr/Mrs/Miss.....

You are being asked to take part in a study about the factors affecting prescribers' choice of drugs in the management of heart disease and the role of hospital pharmacists in the disease management in Khartoum hospitals. This study aims to ensure that heart disease patients are not missing the benefits of the pharmacological interventions that can decrease mortality and morbidity.

Cardiovascular disease (CVD) once thought to be confined to industrialized nations has emerged as a major health threat in developing countries. Management of the disease in these countries is said to be limited because of other competing health issues. Published studies have shown that CVD is one of the specialities very much influenced by clinical prescribing guidelines however there are major arguments about the advantages and disadvantages of the use of guidelines in prescribing.

Another question which the study wants to look into is the role of the hospital pharmacist in the cardiac wards in Khartoum hospitals and if they can contribute to effective prescribing. Studies have shown that the impact of the pharmacists in hospitals reduce morbidity and mortality, improve prescribing of medicines and reduce medication errors. Pharmacist impact can be greater if they can provide input at the time of prescribing and this is achieved most of the time in hospitals when pharmacists are present as a full member of the patient health care team.

You have been chosen because you are either a cardiology prescriber or a ward pharmacist covering cardiology wards in one of the hospitals in which the research is taking place. We would like to hear your views, opinion and experience about the research questions.

Part 1 of this information letter tells you the purpose of this study and what will happen to you if you take part. Part 2 gives you more detailed information about the conduct of the study. Please take time to read this information carefully and talk to others about this if you wish. If you would like more information or if there is anything that is not clear, then please contact the researcher Hwaida Elsadig (Contact details below).

Thank you for reading this.

Part 2:

Do I have to take part?

No. It is up to you to decide whether or not you want to do this research. If you do take part you can keep this information sheet and you will be asked to sign a consent form. If you decide to take part you can still change your mind later, without giving a reason.

What will happen during the study?

If you agree to take part in the study, you will be asked to do an interview with the researcher. You will be contacted by the Research Officer, who will explain things to you in further detail. A suitable time and place will be arranged for the interview to occur. This can be at a place of your choosing. You will also be asked to sign a consent form. The interview will follow a flexible approach during which the researcher will have questions to ask regarding the research questions. We expect the interview to last between 45 and 60 minutes.

The interview will be recorded and you will be asked your consent for this to happen. When the tape is being written up, you will not be able to be identified in any way from the recording. The first part of the study will take between 4 to 6 months to complete so you may contact the researcher at any time if you would like further information.

Expenses

We expect to interview you at your place of work at a mutually agreeable time.

What are the possible disadvantages and risks of taking part?

Taking part in the study is very unlikely to put you at any risk. In the unlikely event that the interview brings up difficult issues for you, the researcher will deal with these sensitively. You may ask to stop the interview at any time.

What are the possible advantages of taking part?

We do not expect that there will be direct personal advantage to you in taking part. However the information you give us will help us to understand and describe different issues regarding the pharmacological management of heart disease in Khartoum hospitals.

What if something goes wrong?

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed. However, if you wish to complain or have any concerns about any aspect of the way you have been approached or treated during the course of this study, you can contact the local supervisor in Al-Shaab hospital or the lead supervisors in Bath University (contact details below).

Will my taking part in the study be kept confidential?

Yes. We will follow ethical and legal practice and all information about the participants will be handled in confidence. All information coming from any of the interviews will not have any name on it and will not be shared with anyone else who is not part of the study. Once the study is completed the interview tape will be kept in a secure place for

3-5 years and then destroyed. You can see the written report of your participation at any time.

What will happen to the results of the research study?

We may have some of what you say printed in a journal, report or thesis. If this happens your name and details will always be removed, so that nobody will know whose words they are. If you are interested to know more about the results, you should contact the researcher or supervisors for further information.

Who is organising and funding this research?

The study is supported by a grant from the University of Bath in UK.

Who has reviewed this study?

This study has been reviewed by the National Health Research Ethics Committee of the Federal Ministry of Health in Sudan.

Who do I contact for further information?

If you have any other questions, please contact the researcher or the supervisors:

Contact Details:

Researcher: Hwaida Elsadig
Tel no (Sudan): 906111128
Email: h.m.elsadig@bath.ac.uk

Lead supervisors: Prof.Marjorie Weiss: m.weiss@bath.ac.uk
Dr.Jenny Scott: j.a.scott@bath.ac.uk
Dr. Raisa .Laaksonen: raisa.laaksonen@helsinki.fi

Local supervisor: Mr. Ahmed Al-Sayed: asaelsayed@hotmail.com

What do I do now?

If you would like to take part, you can complete the reply slip, leave it in your office and the researcher will come and collect it in the next few days or you can directly contact the researcher (See contact details).

Thank you for your time

I would be interested in helping with this research project on the prescribing in cardiology

Name:

Place of work:

Preferred method of contact (circle one):

Telephone:

Email:

What is the best time of day to contact you?

Do you have a date in mind that you will be available for an interview?

Thank you for your help!

Appendix 4 Consent form

Researcher: Hwaida Elsadig
Department of Pharmacy &
Pharmacology
University of Bath, BATH BA2 7AY
Email: h.m.elsadig@bath.ac.uk



HEALTH CARE PROFESSIONAL CONSENT FORM

Please initial the box

1. I confirm that I have read and understood the information provided to me about the above study ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time ☐
3. I agree to take part in the above study ☐

Name of participant

Date

Signature

Name of researcher

Date

Signature

1 for participant; 1 for researcher

Appendix 5 Frame-work analysis

Frame-work analysis of interviews

Influences on prescribing

Consultants and years of experience in cardiology	Clinical factors	Drug related factors	Evidence	Cost (Brand versus Generic, B/G)	Drug Availability	Patient choice	Drug formulary	Experience	Follow up	Patient education	Company Representatives
KAG (1 yr) F	Diagnosis	Side effects/contraindication	Best treatment according to guidelines	Patient affordability/health insurance. B/G: High quality of drugs from big companies but not all are covered by insurance	Availability of the drug	e.g. Preference for tablets over injections	Try to prescribe what available in hospital	Referring to seniors if in doubt	Patient do not come back in time for follow up		
IAS (1 yr) M	Diagnosis	Contra-indications	Evidence for drug use	Patient socioeconomic state B/G: Expensive 'brand' drugs have better effect	To ensure that drug is available in pharmacy	Choice of the trade name	No hospital formulary	For different views, the senior' views are followed			
LAG (10yrs) F	Patient condition			Issues with prescribing expensive drugs B/G: Different Responses from different trade names	Availability of drugs	Ask for the cheaper trade name of drug	Two drugs of every class are in the formulary, one cheaper than the other			Care in prescribing certain drugs as warfarin will depend on patient/family literacy	

cont...											
Consultants and years of experience in cardiology	Clinical factors	Drug related factors	Evidence	Cost (Brand versus Generic, B/G)	Drug Availability	Patient choice	Drug formulary	Experience	Follow up	Patient education	Company Representatives
BAS (19yrs) M	Symptoms of the disease/ Age			Patient financial state B/G: Prefer patients to stick to one trade name	Availability is not reliable	Doctor makes choice for the patient	No formulary		Problem for patients outside Khartoum, sometime affect drug compliance	Patient awareness of complication, some patients get 'phobia' from S/E in the leaflet	
AAS (5yrs) M	Comorbid conditions/ Age		Evidence-based medicine (right drug-right desired effect)	Cost versus effectiveness B/G: Price can compromise treatment when it comes to B/G	Availability affects compliance	Patient get involved when it comes to price; also psychological attachment to a specific trade name	No formulary		Trust and good communication will ensure good follow up		No influence From medical representatives
KAS (27yrs with gaps) M	Aetiology of the disease			Expenses (for patient) B/G: Don't use trade name unless issues of bioavailability	Availability	Doctor makes the choice for patients	No formulary		No follow up in Sudan and cannot stick to the follow up recommended by guidelines	Illiteracy problems affects certain drugs use (e.g. warfarin)	

cont...	Clinical factors	Drug related factors	Evidence	Cost (Brand versus Generic, B/G)	Drug Availability	Patient choice	Drug formulary	Experience	Follow up	Patient education	Company Representatives
Consultants and years of experience in cardiology											
MAS (12 yrs in cardiology (not cardiologist) F	The disease			Cost B/G: depends what name can be remembered easily; from experience effectiveness vary	Availability	Not allow the patient to be involved in prescribing					
NAS(11yrs) M	The disease			Cost B/G: prefer trade names but it depends on patient financial state	Availability	Patients are involved when affordability is an issue			Follow up is a problem; patient only come back when things deteriorate; also affects prescribing of certain drugs	Illiteracy problems affect use of certain drugs e.g. warfarin	
QAS(starting fellowship) F	Symptoms	Drug interactions S/E (sometimes related to certain trade names)		Cost B/G: Believe in certain trade names but it depends on patient financial state	Availability	Patient are involved specially when affordability is an issue	Not aware of formulary	Practice and experience opinion			The more they visit doctors the more their drugs are prescribed

cont...											
Consultants and years of experience in cardiology	Clinical factors	Drug related factors	Evidence	Cost (Brand versus Generic, B/G)	Drug Availability	Patient choice	Drug formulary	Experience	Follow up	Patient education	Company Representatives
ZAS(24yrs) M	Symptoms and underlying conditions	Frequency of administration, S/E (sometimes related to certain trade names)		Cost B/G: Patient financial state affects choice but preference of 'brand' in serious conditions		Not really involved	No formulary (pharmacy is privately owned)		Using personal effort to work out solutions to ensure follow-up	Patient education, easier if patient can stick to the same brand or generic name.	Update on new drugs
SAS(14yrs) M			Evidence-based medicine from guidelines	Cost B/G: Patient financial state and availability of insurance. Only for special drugs there is a preference for expensive trade names			No formulary		Major problem in the absence of primary care		Updating role but no influence on personal ideas
GAG(First year in cardiology fellowship) M		Frequency of administration		Cost of the drug B/G: Preference for drugs of big companies		Patient may have preference to specific trade name of the drug	Available mainly for emergency drugs				

Use of prescribing guidelines

Consultants and years of experience in cardiology	Use of guidelines for prescribing	Availability of national guidelines	Use of international guidelines	Guidelines versus experience	Preferred international guidelines for cardiology
KAG (1yr) F	Treatment according to guidelines	National guidelines for hypertension	They are not made for people in Sudan; some of the drugs recommended are not available	Experience limited so try to stick to guidelines; senior doctors depends on experience	American guidelines
IAS (1yr) M	Guidelines to be followed	Not available	Can be applied in most of the situations; Was not in a situation where guidelines were not applicable	Guidelines always first	NICE ((BHF)) guidelines
LAG (10yrs) F	Guidelines cannot always be followed	National guidelines for hypertension available but not adopted	Attempts in the hospital to make guidelines based on international guidelines	Older generations of prescribers prefer to stick to experience	American guidelines
BAS (19yrs) M	Not applicable in all cases	Guidelines for hypertension (ACS and heart failure in progress)	Not applicable in all cases	Experience more important. Experiments are conducted on restricted situations	American and Saudi guidelines
AAS (5yrs) M	Improve survival, and make treatment and team work easier	Hypertension guidelines(other protocols for management are available based on guidelines)	Cost and availability of drugs hinder following guidelines. Guidelines adapted to personal settings(cardiac care limited resource setting)	Experience is based on evidence from guidelines, both work together well; guidelines are not rigid allowing room for experience so both work well together	American and European (there is a difference)
KAS (27yrs with gaps) M	For the patient benefit, Appropriate prescribing is guidelines	National guidelines were not made appropriately	No major problems with following international guidelines(most of them are now joint guidelines)	Guidelines before experience	American guidelines
MAS (12yrs in cardiology, not cardiologist) F	Not much into guidelines, use what is known and common in Sudan		Do not use any specific foreign guidelines	Prescribe based on experience of what is known	

Cont...					
Consultants and years of experience in cardiology	Use of guidelines for prescribing	Availability of national guidelines	Use of international guidelines	Guidelines versus experience	Preferred international guidelines for cardiology
QAS(starting fellowship) F	Not much experience	Can be of advantage to unify treatment		Always consider my seniors' opinions	
ZAS(24yrs) M	Difficult to unify treatment in Sudan(resources vary)	Not available, attempts till now were not successful	Not suitable for Sudan	Therapeutic traditions precede over guidelines	
SAS(14yrs) M	Guidelines are important factor for prescribing	Guidelines for hypertension (some protocols under review by the ministry of health)	Can be used with adaptation to the situation in Sudan	Experience takes precedence over guidelines	Preference for European and then American
GAG(first year in cardiology fellowship) M	Important, most of the time cannot be applied	Some are available but people don't know about them	Can be used with some modification	Guidelines and experience of the seniors	American guidelines
NAS (11 yrs) M	Important	Not available	Can be used with adaptation to the situation in Sudan	Experience and guidelines	American guidelines

Role of hospital pharmacist

Consultants and years (yrs) of experience in cardiology	Contact with pharmacists	Current role	Expected role	Type of experience
KAG (1yr) F	One pharmacist available on the ward	Informing doctors of side effects and interactions/MI service	Can recommend medication if doctors forget to prescribe	Found the pharmacist to be useful
IAS (1yr) M	Only in contact with medical representatives (usually pharmacists)	No pharmacist on the ward/never used MI service	Should be clinical, part of the team, participate in patient management	No experience
LAG (10yrs) F	In contact with one pharmacist in the hospital	Drug related issues information, formulary, part of the group to make hospital guidelines		Happy with what the pharmacist is doing
BAS (19yrs) M	One pharmacist on rounds (use to have pharmacist on ward 5yrs ago)	Just starting	Can be useful for S/E and interactions	Team work is required
AAS (5yrs) M	Have a new clinical pharmacist on the ward round	Not aware of any current contribution/never used hospital MI	Interactions	Never used them (don't like pharmacists who are medical reps.)
KAS (27yrs with gaps) M	Being on the wards is not part of their job in Sudan	Did not come across clinical pharmacists in the hospital	Drug monitoring and help in providing proper team work	In contact with medical reps, information is not reliable as basic teaching of pharmacy is lacking
MAS (12 yrs in cardiology (not cardiologist) F	Aware of one pharmacist, the chief pharmacist	No pharmacists on the ward		The chief pharmacist for drug supply problems
NAS(11yrs) M	Only in contact with company reps. pharmacists	Cannot contribute in the absence of guidelines		
QAS(starting fellowship) F	Not in contact with hospital pharmacists	In the pharmacy(dispensary)	Participation, be in contact with doctors and available in ward rounds	
ZAS(24yrs) M	Previous contact , no longer available, good social relations	In the pharmacy (dispensary)	Can contribute if they have more confidence in their abilities	Previous MI service provided by pharmacists, no longer available
SAS(14yrs) M	No clinical pharmacists in the hospital (previous contact with pharmacists in Ireland)	Not aware of any contribution	Attendance of rounds, advice on drugs, but difficult to be prescribers	Not aware of MI in hospital
GAG (first year in cardiology fellowship) M	A pharmacist is available on the ward	Assist in reviewing doses (as an example)		Pharmacist available by phone for advice

Appendix 6 Questionnaire with the prescribers

Respondent Information Leaflet

Prescribing in cardiovascular disease and the role of the hospital pharmacist in Khartoum cardiac units

Dear Dr:

You are asked to take part in a research study. You have been chosen because you are a prescriber in cardiology in one of the hospitals in which the research is taking place.

Interviews have been conducted with some of the doctors working in cardiac units in Khartoum about their opinions in what influence their prescribing and what they think is the role of the hospital pharmacist. The purpose of this questionnaire is to explore the prevalence of these opinions in a larger group of prescribers and to identify potentially new opinions.

Please take time to read this information and the covering letter that accompanies this questionnaire. Some of the questions will require a written answer; if you prefer to do that in Arabic language please feel free to do so. If you would like to receive more information on this research or if there is anything that is not been explained clearly, then please contact the researcher on 0906111128. Alternatively you can contact the research lead supervisor, Dr. Jenny Scott on j.a.scott@bath.ac.uk.

This research has been approved by the National Ethics Committee of the Federal Ministry of Health in Khartoum. The information gathered will be treated with strict confidentiality and will only be used for the purposes of this research. The research is for a PHD study so we hope that we can publish some of the findings. No participant will be identified at any stage during or after the research. Any information gathered will be safely stored with the researcher and disposed of securely within five years of this project.

We would like now to express our thanks for your support in advance. If you would like to receive a summary of the results of this questionnaire please leave your contact information below. The final results are expected to be available within two years' time.

Hwaida Elsadig
Research Pharmacist

QUESTIONNAIRE

Firstly, we would like to ask you some questions about yourself. Please, tick as appropriate and follow other instructions.

i) Gender: Female ☐ Male ☐

ii) Current place of work: Government hospital ☐ Private hospital ☐ Both ☐

Others (please specify): _____

iii) Please give information about your current position (e.g. medical officer, registrar, physician, cardiologist and/or any other titles): _____

iv) Years of practice as a doctor: _____

v) Did you study for your medical degree in Sudan? Yes ☐ No ☐

If no, please specify in which country: _____

vi) Are you currently doing your postgraduate qualifications? Yes ☐ No ☐

vii) Have you completed your postgraduate qualifications? Yes ☐ No ☐

viii) If yes (to question vii), was that in Sudan? Yes ☐ No ☐

ix) If no (to question viii), please specify in which country(s):

x) Any work experience outside Sudan: Yes ☐ No ☐

xi) If yes (to question x), please specify, in which country(s) and for how many years in each country:

A. The first section is exploring the different sources of information generally used by doctors to assist prescribing.

Please consider the following statement, choose your response from the list below and then 'tick' in the box that applies to you for each option in the list:

'I often use the following information source for drug choice'

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1- Senior doctors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2- Other colleagues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3- Medical textbooks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4- Journal Publications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5- Drug company representatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6- Community pharmacists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7- Internet (websites)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8- Medical conferences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9- Hospital pharmacists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10- Hospital formulary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11- Clinical Guidelines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12-Are there any other sources (not mentioned above) that you use? Please specify:

B. The following section is about the different factors that may influence prescribing in heart disease.

Please consider the following statement with regard to the following 'list of factors which may influence prescribing' and then 'tick' in the box that applies to you:

'The following factor is important in my choice of drug for my patients'

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
13- Availability of the drug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14- Patient choice of medicines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15- Patient (or patient carer) is educated enough to know about the safe use of their medicines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16- Drug related effects (e.g. side effects, contraindications)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17- Drug frequency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18- Patient medical condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19- Information from the drug representative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20- The likelihood of patients coming back for follow up after discharge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21- Information from colleagues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22- Drug monitoring (e.g. lab tests)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23- The company making the drug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24- Drug cost implication on the patient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25- Guidelines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26- Working place (whether government or private sector)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27- Personal experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

28- Are there any other factors (not mentioned in the previous list of factors which may influence prescribing) that you consider for drug choice? Please specify:

29- Please select from the list of factors in page 4 (or if there is any other factor that you consider not mentioned in the list) the THREE most important factors that influence your choice of drug for your patients and write them in order of their importance for you:

1- First important factor:

2- Second important factor:

3-Third important factor:

What is your opinion about the following statements regarding clinical guidelines?
Please 'tick' in the box that applies to you for each statement:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
30- It is not possible to apply treatment guidelines in practice in Sudan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31- It could be possible to make Sudanese guidelines for cardiology that could be followed in Sudan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32- International guidelines for cardiology can be followed in practice in Sudan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33- For guidelines to be followed they need to be made putting in mind the targeted population(e.g. Sudanese population)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34- Clinical guidelines are more important than clinical experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35- Clinical experience is more important than clinical guidelines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36- Clinical guidelines are not relevant at this stage of my practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37- The current clinical practice in my hospital is not based on guidelines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38- Adherence to written guidelines is not always desirable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

39- How often do you use guidelines when prescribing for heart disease patients?
Please 'tick' in the box that applies to you:

Never	Rarely	Sometimes	Often	Very often
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

40- Are there any Sudanese guidelines in cardiovascular disease?

Please 'tick' in one of the boxes:

1. Yes	<input type="checkbox"/>
2. No	<input type="checkbox"/>
3. Not sure	<input type="checkbox"/>

40 b- If yes, please specify the name (s) of the guidelines and the authors (if known):

41- If you happen to use guidelines when prescribing; please specify the name(s) of the guidelines you prefer to use for cardiovascular disease and please tell us why you prefer it:

The following statements are about brand and generic drugs. For example, in Sudan, the drug paracetamol is available as Panadol, Amidol, Paramol (and others). In general, Panadol is considered to be the main brand name while Paramol and Amidol are considered as generics.

With regard to drugs used in cardiology, please consider the following statements and then 'tick' in the box that applies to you:

42- The effectiveness of generic drugs is comparable to (that is, as good as) the brand drug:

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

43- The safety of generic drugs is comparable to the brand drug:

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree e
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

44- The high price of a drug implies better effectiveness:

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C. The final part of this questionnaire explores the contribution of hospital pharmacists in disease/patient management.

45- How often are you in contact with a hospital pharmacist?

Please 'tick' in the box that applies to you:

Never	Rarely	Sometimes	Often	Very often
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you are in contact with hospital pharmacists where do you usually meet the hospital pharmacist(s)?

Please 'tick' in the box that applies to you for each option in the list below:

	Very often	Often	Sometimes	Rarely	Never
46- On the wards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47- In pharmacy (dispensary)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48- In pharmacy office	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49- In medicine information centre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50- In multidisciplinary meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51- Other areas in the hospital	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

52- If you are in contact with hospital pharmacists by any other means (e.g. phone, email) please specify the means of contact:

The following statements are about different activities related to the role of hospital pharmacists.

Please indicate what you think hospital pharmacists are currently doing in your hospital. Please tick' in the box that applies to you for each statement:

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
53- Dispense medications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54- Educate patients about their medicines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55- Identify drug related problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56- Assist the prescriber in recommending medicines to be prescribed for the patient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57- Detecting prescription errors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58- Inform prescribers about availability of drugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59- Inform prescribers about guidelines therapy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60- Establish patient drug history	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61- Inform the prescriber about cost-effective treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62- Providing drug – related information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63- Ensuring prescribers are providing optimum therapy for patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

64- Are there any other hospital pharmacists' role(s) (not mentioned above) that you have come across in your hospital? Please specify:

Many thanks for your contribution

Appendix 7 FGD guide

Focus groups with pharmacists

Topic Guide

- 1- Role of the clinical pharmacist (difference from before)
 - Description of activity
 - Ward pharmacists
- 2- Current influence of hospital Pharmacist
- 3- Clinical pharmacy training
- 4- Difficulties encountered
- 5- Pharmacist-doctor interaction
 - Ward rounds
 - Medicine information
- 6- Pharmacist-patient relationship
 - Drug histories
 - Counselling
- 7- Miscellaneous
 - Years of experience
 - Post graduate training

Any further comments

Thank you for your time

Appendix 8 Questionnaire with clinical pharmacists

Clinical Pharmacy in Sudan

Dear Pharmacist:

You are asked to take part in a research study. You have been chosen because you are registered as a clinical pharmacist with the Sudanese Society of Clinical Pharmacy. We obtained your contact details by permission from the society.

The study is part of a PHD project with the universities of Bath, UK and Helsinki, Finland. In this part of the study we wish to explore the role of hospital clinical hospital pharmacists, hence, we would like to ask you to participate in the attached survey. It should take no more than 10 min to complete the survey.

This research has been approved by the National Ethics Committee of the Federal Ministry of Health in Khartoum. The information gathered will be treated with strict confidentiality and will only be used for research purposes. No participant will be identified during or after the research or in the reports that result. Any information gathered will be safely stored with the researcher and destroyed after five years of the completion of the project.

If you would like to receive more information on this research or if there is anything that is not been explained clearly, then please contact me (the researcher) or any of the research supervisors in the contact details shown below.

Please respond to this questionnaire before 30th of April 2014.

Thank you for your support.

Yours sincerely

Hwaida

Contact details:

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Firstly, we would like to ask you some background questions about yourself. Please, tick as appropriate and follow other instructions.

i- When (year) did you obtain your degree (qualification) as a clinical pharmacist?

ii- Did you complete your clinical pharmacy course in Sudan? Yes ☐ No ☐

iii- If yes (question iii), please tell us in which university.

iv- If no (question iii), please tell us in which country.

v- Are you currently working as a clinical pharmacist in a hospital in Sudan?

Yes ☐ No ☐

vi- If yes (question vi), when (year) did you start working as a clinical pharmacist in a hospital?

vii- If no (question3), have you ever worked in a hospital in Sudan as a clinical pharmacist?

Yes ☐ No ☐

vii- If you are currently not working in a hospital in Sudan, can you briefly tell us about your current field of practice (e.g. sales, community pharmacy, etc.)?

ix- Gender: Female ☐ Male ☐

In the following part of the questionnaire we would like to ask your opinion as a clinical pharmacist about clinical pharmacy practice in hospitals in Sudan. Please follow the instructions provided.

A) Clinical pharmacists in Sudan are those pharmacists with post graduate qualification in clinical pharmacy. Clinical pharmacists are expected to acquire new roles with regard to patient care in hospitals. The following statements are about different activities related to the role of clinical pharmacists in hospitals. To what extent in your opinion are these statements related to the role of clinical pharmacists in hospitals in Sudan?

Please 'tick' in the box that applies to you for each statement:

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
1-To provide drug related information to healthcare professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2-To educate patients about their medicines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-To identify drug related problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4-To assist doctors in prescribing drugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5-To provide drug related information mainly to doctors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6-To inform doctors about availability of drugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7-To inform doctors about therapy guidelines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8- To take drug histories of patients on admission	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9-To inform doctors about cost-effective treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-To provide drug-related information mainly to patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11-To participate in multi-disciplinary clinical care teams meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12-To ensure prescribers are providing optimum therapy for patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13-To be involved in doctors' choices of medicines to patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B) Clinical pharmacy is considered to be a relatively new area of practice in hospitals in Sudan. The following statements consider some possible obstacles facing clinical pharmacists and clinical pharmacy practice in hospitals in Sudan. What is your opinion with regard to the following statements? Please 'tick' in the box that applies to you for each statement:

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
14- Availability of information sources (clinical, pharmaceutical) limits the extent of clinical pharmacy practice in hospitals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15-Clinical pharmacists are resistant to change from their traditional roles to expanded new clinical roles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16-There is limited support from doctors for the new role of clinical pharmacists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17- Clinical pharmacists are not confident that they have the required clinical skills to perform their new clinical roles in hospitals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18- Hospital payment (salaries/incentives) for clinical pharmacists has no influence on their motivation to provide clinical services in hospitals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19- Doctors following international guidelines when prescribing create an obstacle for pharmacists to intervene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20-The unavailability of national guidelines for treatment is an obstacle for clinical pharmacy practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Cont.....	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
21- Lack of experience of applying clinical knowledge to practice is a barrier for clinical pharmacy practice in hospitals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22-Clinical pharmacists are more concerned with doctors' approval to their roles than actually performing their new expanded roles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23-Doctors are resistant to clinical pharmacists' involvement in assisting in prescribing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24-The lack of opportunities of continuous professional training is a barrier in performing the expanded roles of clinical pharmacists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25-The lack of enough clinically trained senior pharmacists is a barrier in performing the expanded roles of clinical pharmacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26-The not well-defined description of the role of clinical pharmacists is an obstacle against clinical pharmacy practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27- Pharmacists lack of communication skills affects their interaction with the prescribers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28- The lack of enough clinical pharmacists in hospitals affects the development of clinical pharmacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29- Access to patients' notes is an obstacle in clinical pharmacy practice in hospitals in Sudan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C) Clinical guidelines are perceived by many healthcare professionals and healthcare organisations as a necessity for providing optimum patient care. These guidelines are usually derived from evidence-based medicine made available by clinical trials. The following statements are about the application of clinical guidelines in practice in Sudan. What is your opinion with regard to the following statements?

Please 'tick' in the box that applies to you for each statement:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
30-It is not possible to implement clinical guidelines in practice in Sudan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31-It is possible to implement international guidelines in practice in Sudan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32-For guidelines to be followed they need to consider the socio-economic state of the specific targeted population	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33- Guidelines need to be developed based only on scientific evidence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34- The current prescribing in hospitals is not based on guidelines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35- Pharmacists have a duty to ensure that doctors' are following evidence-based medicine (promoted by guidelines) when prescribing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36- Adherence to written guidelines is not always desirable in clinical practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have any further information or comments that you would like to add from your experience or practice or about any aspect covered in the questionnaire, please feel free to do so in the space below.

Thank you for completing this questionnaire